

WILDLAND FIRE MANAGEMENT PLAN

Hopewell Culture National Historical Park

September 2004



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EXECUTIVE SUMMARY

Fire management policies of the National Park Service (NPS) support the park's resource management goals. An overriding goal is restoration or maintenance of the historic scene and the associated cultural resources, while providing for firefighter and public safety, protection of natural and cultural resources, and human developments from unwanted wildland fire.

This fire management plan contains the following program direction:

To guide the decision-making process where safety, social, political, and resource values are evaluated, and appropriate management response strategies are identified for wildland fires.

To provide a framework for fuels management strategies through the use of prescribed fire, mechanical, and chemical treatments.

To provide a platform to cooperate more fully in planning and implementing a wildland fire program across agency boundaries.

Program operations included in the plan are preparedness, prevention, suppression, and fuels management. Applicable resource goals and objectives are derived from approved agency resource and general management plans.

The plan is organized to combine the latest scientific knowledge, including regional and local studies, with a hierarchy of policy direction from Departmental and Agency to the Federal Wildland and Prescribed Fire Management Policy (1995 and 2001) to accomplish resource and fire management goals and objectives. The intent of the plan is primarily operational in nature.

Compliance requirements with National Environmental Policy Act (NEPA) guidelines have been satisfied through development of an environmental assessment (EA). These requirements ensure a prudent assessment and balance between a federal action and any potential effects of that action, leading to consensus between fire managers, agency resource specialists, and the public. Any constraints or limitations imposed on the fire management program are also included.

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I. INTRODUCTION

A. Reasons for Developing Fire Management Plan

The National Park Service's Director's Order 18, (Wildland Fire Management, 2003) requires that all parks with vegetation capable of sustaining fire develop a fire management plan (FMP). There are 1,170 acres of land within Hopewell Culture National Historical Park, referred to throughout this document as the park, which are burnable. Land that can sustain fire is covered with vegetation that consists of grasslands, deciduous forests, agricultural fields, and wetlands. Burnable land would benefit from periodic, prescribed fires. In addition, the use of prescribed fire as a resource management tool is expected to play an important role in meeting Vegetation Management Plan objectives as well as a tool for controlling or eradicating invasive exotic species. This FMP will cover wildland fire suppression and prescribed fire activities.

B. Collaborative Process in Development of Fire Management Plan

The General Management Plan (1997), Resource Management Plan (1995), Vegetation Management Plan (2002), and fire management plan are all developed with input from neighboring communities and cooperating agencies, as well as other National Park Service program management areas. Cooperating agencies included Ohio Interagency Dispatch Center, Ohio Department of Natural Resources, National Weather Service, and Ohio Department of Air Pollution Control.

C. Implementation of Federal Fire Management Policy

This fire management plan (FMP) will implement fire management policies and help achieve fire management goals defined in: (1) Federal Wildland Fire Management Policy and Program Review (1995); (2) Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (USDOJ/USDA) (2000); (3) A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Comprehensive Strategy Implementation Plan (2001); and (4) Review and Update of the 1995 Federal Wildland Fire Management Policy (2001).

D. Compliance

In compliance with the National Environmental Policy Act (NEPA), an environmental assessment (EA) and a finding of no significant impact (FONSI) has been prepared for this fire management plan, and placed in Appendix D. Prescribed fire and fuels treatment projects, other than those identified in the environmental assessment, will have additional

compliance work conducted as appropriate. This will include biological assessments and cultural/historical site surveys as appropriate.

E. Authorities for Implementation of Fire Management Plan

The authority for fire management is found in the National Park Service Organic Act (Act of August 25, 1916), which states that the Agency's purpose:

"... is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This authority was further clarified in the National Parks and Recreation Act of 1978:

"Congress declares that...these areas, though distinct in character, are united...into one national park system.... The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

Authorities to enter into agreements with other federal bureaus and agencies; with state, county, and municipal governments; and with private communities, corporations, groups, and individuals are cited in Director's Order 20 (Agreements).

II. RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

A. NPS Management Policies as Related to Fire Management

It is the policy of the National Park Service to allow natural processes to occur to the extent practical while meeting the park management objectives. NPS Management Policies (1988) state "Fire is a powerful phenomenon with the potential to drastically alter the vegetative cover of any park. Fire may contribute to or hinder the achievement of park objectives. Park fire management programs will be designed around resource management objectives and the various management zones of the park." Specific guidance on wildland fire is contained in Director's Order 18 (2003) and attendant Reference Manual, RM-18, (2004) for the National Park Service, and "The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide" (1998).

B. Enabling Legislation and Purpose

Hopewell Culture National Historical Park was originally established as Mound City Group National Monument by President Warren Harding by Executive Order 1653 of March 2, 1923 which states: “...*an object of great historic and scientific interest [to] be permanently preserved and protected from all changes that will to any extent mar or jeopardize their value...*”. The park was expanded and the name changed to Hopewell Culture National Historical Park by Public Law 102-294 of May 27, 1992, which incorporated by reference the original purpose of the park.

C. General Management Plan and Fire Management Objectives

The General Management Plan was completed in 1997. The plan’s management objectives (desired objective) that relate to fire management objectives are to:

- Preserve, protect, and interpret the remnants of a group of once extensive archeological resources that might be lost if not protected, including mounds and enclosures, artifacts, the archeological context, the cultural landscape, and ethnographic information.
- Promote cultural resource stewardship and understanding of the importance of the resources to present and future generations.

D. Resources Management Plan and Fire Management Objectives

The fire management plan is subordinate to the Resource Management Plan. The goals of the park's resource management program as they relate to wildland fire management are as follows:

- To provide baseline information on the park’s flora and fauna including populations, distribution, endangered or threatened species and mapping.
- To identify resources that require protection and to develop and implement plans to protect them, particularly on newly authorized sites.
- To adequately assess the impacts land use and associated developments are having or may have on park resources.
- The need to stabilize new sites with appropriate ground cover as they are added to the park and agriculture is discontinued.

The park Vegetation Management Plan (2002) is subordinate to the Resource Management Plan and provides a conceptual framework for making decisions with specific direction on how to achieve a desired condition for each of the earthwork sites. Parkwide treatment goals that guide fire management activities include:

- Preserve original structures, artifacts, materials, and other archeological information and research opportunities.
- Adhere to the *Secretary of Interior's Standards for Archeology and Historic Preservation* in treatment design.
- Design treatment strategies that are suited to the characteristics of each structure, and are sustainable within projected trends for budget and staffing.

E. Fire Management and Meeting Park Objectives

The fire management plan (FMP), especially the prescribed fire components, provides a detailed action program that is consistent with NPS Management Policy and DO-18 (Wildland Fire Management). Implementation of the FMP will support the General Management Plan, Resource Management Plan, and Vegetation Management Plan objectives by specifying fire management strategies designed to protect the earthworks. In addition, wildland fire suppression will protect cultural and natural resources.

III WILDLAND FIRE MANAGEMENT STRATEGIES

A. General Management Considerations

Wildland fire in the park will be managed to enhance community protection, diminish risk and consequences of severe wildland fires, and, to the extent possible, increase health of watersheds. To these ends the park will employ the following goals:

- Improve prevention and suppression.
- Reduce hazardous fuels.
- Promote community assistance.

A community-based approach to wildland fire issues will involve close collaboration and cooperation with neighboring agencies that have a vested interest in areas of wildland fire issues. Fuels management, including both prescribed fire and mechanical treatments, will be used to manage vegetation so as to protect archeological resources.

B. Wildland Fire Management Goals

These goals are programmatic in direction and are intended to provide safe and effective implementation of the fire management plan:

Goal 1: Make firefighter and public safety the highest priority of every fire management activity.

Goal 2: Suppress all wildland fires regardless of ignition source to protect the public, private property, and natural and cultural resources of the park.

Goal 3: Manage wildland fires in concert with federal, state, and local air quality regulations.

Goal 4: Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.

Goal 5: Reduce wildland fire hazard around developed areas and areas adjacent to cultural and historic sites.

Goal 6: Use prescribed fire as a method of restoring and maintaining the cultural and natural landscape to meet resource objectives of the park.

C. Wildland Fire Options

The following is a discussion of available wildland fire options and their use at the park:

1. Wildland Fire Suppression: All wildland fires in the park will be suppressed using the most appropriate management action. Determination of the most appropriate management action will consider human safety, threat and potential damage to property, resources, and cost effectiveness. Resource objectives will not be a criterion in the choice of appropriate management response.

2. Prescribed Fire: Prescribed fire may be used for protection of cultural resources, restoration and maintenance of historic scenes, reduction of hazard fuels and maintenance, hazard fuel reduction, and achievement of natural resource objectives.

3. Wildland Fire Use: This option was rejected due to the size and linear nature of the park, the degree of wildland urban interface along the boundary, and the lack of available qualified personnel required to manage these fires.

4. Non-Fire Applications: The reduction or removal of fuels by mechanical or chemical methods are options that may be used for objectives such as protection of resources, private property, historic scene restoration and maintenance, invasive species control, or meeting other natural resource objectives.

Prescribed fire and mechanical fuel reduction treatments may be used either sequentially or in conjunction with each other.

D. Description of Wildland Fire Management Strategies by Fire Management Unit

1. Hopewell Culture National Historical Park Fire Management Unit

Hopewell Culture National Historical Park is comprised of five separate tracts of land (Mound City Group, High Bank Works, Seip Earthworks, Hopeton Earthworks, and Hopewell Mound Group) totaling 1,170 acres. The park is located in Ross County, Ohio. The park headquarters and visitor center are located two miles north of the intersection of US 35 and SR 104 near the town of Chillicothe. Although the park is divided into five tracts of land, there will be only one Fire Management Unit. Area and the park maps are shown in Appendix S.

a. Physical and Biotic Characteristics

1. Topography: The topography of the park consists of relative flat benches or terraces of glacial valleys or glacial melt flow valleys that comprise the southern edge of glaciation and the northern edge of the Appalachian Plateau. The elevation at park headquarters is approximately 650 feet above sea level.

2. Geology/Soils: In the Mississippian Period of the Paleozoic Era shallow seas in Ohio were filled with sandy sediments, which would later become sandstone, deposited by streams that built deltas into the Mississippian sea. Examples of these rocks are exposed in the region between Chillicothe and Portsmouth. Soils of the area are described as residual sandstone and shale soils. The general soil map unit found at the five park units is described as Gessie-Eldean-Ross; soils with a texture of silt loam to gravelly loam texture and slope of 0-12% (USDA/NRCS 2003).

3. Climate: The park is located in a temperate climate zone with weather conditions ranging from extreme heat and humidity in the summer to cold, icy conditions in the winter. Annual precipitation averages 37.8 inches. June through August is the warmest period while December through March is the coolest.

4. Water Resources: The Mound City Group, Hopeton Earthworks, and Hopewell Mound Group units have small intermittent streams within their boundaries. Water quality of these streams is unknown. The Scioto River, Paint Creek, and the North Fork of Paint Creek run adjacent to parklands, but the park has no direct management responsibilities for water quality in these rivers.

5. Federal and State Listed, Threatened and Endangered Species: Three Federally listed species may occur in Ross County.

Federally listed endangered Indiana bat (*Myotis sodalis*) may occur throughout Ross County. Park land does support potential habitat and thus this species may occur on park land, although a bat inventory conducted in May 2004 did not capture an Indiana bat. Based on Ohio Department of Natural Resources (ODNR) records, there are no Federally threatened bald eagle (*Haliaeetus leucocephalus*) nests within one mile of park boundaries, and no suitable habitat exists for timber rattlesnake (*Crotalus horridus horridus*) within park boundaries.

State species of concern or listed include bird, fish, and reptile species. There are two state species of concern for birds, sharp-shinned hawk (*Accipiter striatus*) and prothonotary warbler (*Protonotaria citrea*), that have been observed within park land, along with the state endangered species of the northern harrier (*Circus cyaneus*). A state endangered fish, the eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*), has been documented in Paint Creek, which borders Seip Earthworks. There are two state species of concern for reptiles, eastern box turtle (*Terrapene carolina*) and false map turtle (*Graptemys pseudogeographica*), found in park boundaries.

6. Wildlife: The park has wildlife that is typical for the area. For a list of wildlife recorded for the park see Appendix C.

7. Vegetation: The natural climax community for this area would be an oak-hickory forest, however, the park is not going to allow deep-rooted trees grow on the earthworks, the managed ground cover will most like function as a mosaic of bluestem prairie and oak-hickory forest type. This mosaic will need to be maintained by fire or mechanical methods in order to keep the woody species from encroaching on the grassland areas that contain the earthworks. Exotic plant species of special concern include Japanese honeysuckle, Canada thistle, garlic mustard, and Johnson grass. For a list of plant species recorded in the park see Appendix C.

8. Fire Effects: The park vegetation is best described by Kuchler Type: *oak-hickory forest*. A detailed description that describes plant communities, management considerations, and fire ecology of oak-hickory forest can be found at the Fire Effects Information System website at: [FEIS Home Mosaic of bluestem prairie and oak-hickory forest](#).

9. Air Quality: The park has no air quality monitoring capabilities, and the State of Ohio does not monitor air quality in Ross County. The park is classified as a Class II airshed by the Environmental Protection Agency and resides within the Wilmington-Chillicothe-

Logan Intrastate Air Quality Control Region (Ohio) as defined in section 302(f) of the Clean Air Act, 42 U.S.C. 1857h(f)). The State of Ohio agency responsible for air quality is the Ohio Environmental Protection Agency, Division of Air Pollution Control.

10. Cultural Resources: The park contains numerous archeological sites, most notably five prehistoric Hopewell earthworks consisting of mounds and embankments. The park contains additional archeological resources that have not yet been surveyed or described.

11. Adjacent Landownership: The four of five units of the park are surrounded by privately owned land that is predominantly rural agricultural in nature. There is significant and ongoing residential development on lands close to some of the park units. The fifth unit of the park is surrounded by government-owned institutional facilities including two State prisons and a U.S. Veterans Administration hospital.

b. Strategic and Measurable Fire Management Objectives

- Ensure that all wildland and prescribed fire operations sustain no injuries to members of the public or firefighters.
- 95% of all unscheduled wildland fires are controlled during initial attack (24 hours or 10 acres).
- 100% of all prescribed fires are conducted consistent with federal, state, and local smoke management requirements.
- Manage suppression actions so that rehabilitation costs are less than 10% of suppression costs.

c. Management Considerations

These constraints, considerations, or decision criteria will influence all fire management activities within the fire management unit.

- No unacceptable impacts to cultural resources or threatened and endangered species are permitted.
- Socio-political economic impacts, including wildland urban interface (WUI), are considered in developing implementation plans.

- The public, organizations, and cooperating agencies will be notified of any suppression or prescribed fire operation that may impact them.

d. Historic Role of Fire

Lightning-caused fires account for approximately 1% of all wildland fires in Ohio. Estimates are that the natural fire return interval for heavily forested sites in northern Ohio from 1923 to 1978 to be 643 years given current conditions (Boerner and Cho 1987). Today, however, fires are suppressed resulting in a shift in fire return interval from a few years to a few millennia.

The role of fire has varied with each period of land use. Evidence for the purposeful use of fire by prehistoric and historic Native Americans has been difficult to substantiate. Prehistoric Native Americans undoubtedly used fire for a variety of reasons. While it can only be speculated as to type and amount of this use, hunting, crop management, improve crop/wildlife growth and yields, fireproof areas, insect collection, pest management, warfare and signaling, economic extortion, and clearing areas for travel represent known examples of fire use by historic Native Americans (Williams 2002). Oak savanna remnants may be a relic of Native American fire practices.

The arrival of European settlers again changed the role that fire played in order to better meet their needs. Through the turn of the 20th century, settlers often used fire to clear the land of brush and trees in order to create and maintain farm land for crops and new pastures for grazing animals. The fire return interval for this period has been estimated to range from 3 to 7 years.

Active suppression of wildland fire in Ohio had its origins in southern Ohio in the early 1920s. This policy, which continues today, has further altered the appearance of the landscape. In this instance the lack of fire has resulted in the reduction of oak savanna and a return of woody species to lands that are not maintained through continued agricultural use.

Currently there are not sufficient studies on the historic role of fire in southern Ohio. Research is necessary to determine the local fire history.

e. Wildland Fire Management Situation

1. Historical Weather Analysis:

The park is located in a temperate climate zone with weather conditions ranging from extreme heat and humidity in the summer to cold, icy conditions during the winter (Table 1). Annual precipitation averages 37.8 inches. Monthly precipitation averages are fairly

uniform in amount. June through August is the warmest period while December through March is the coolest. Temperatures can vary from above 100° to well below zero. Electrical storms with accompanying strong winds are frequent during the spring through early fall, especially during frontal passages. The park is rated at a National Fire Danger Rating Service (NFDRS) climate class 3.

Table 1. Historical Climate Data (Mound City Group, Chillicothe, Ohio)

Station: 331528

Temperature Summary

Normals 1971-2000

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Max °F	37.7	42.3	52.5	63.4	73.4	81.4	85.2	84.0	78.0	66.3	53.5	42.6	63.4
Min °F	17.9	20.9	29.4	38.9	49.4	58.7	62.7	60.5	52.8	40.4	32.5	23.7	40.7

Temperature Extremes Period of Record: 1972-2001

Month	High Mean°F	Year	Low Mean°F	Year	1-Day Max°F	Date	1-Day Min°F	Date
JAN	38.6	1990	13.3	1977	73	1999	-29	1994
FEB	39.3	1998	16.7	1978	77	2000	-14	1982
MAR	49.1	1973	33.0	1984	83	1998	-10	1980
APR	57.7	1985	46.0	1975	90	1986	13	1972
MAY	69.3	1991	56.5	1997	93	1982	29	1983
JUN	74.5	1991	64.8	1972	103	1988	35	1972
JUL	79.8	1999	71.1	1976	103	1988	41	1988
AUG	77.7	1983	67.8	1976	105	1983	39	1986
SEP	69.7	1998	60.5	1975	100	1983	31	1974
OCT	59.4	1984	47.7	1988	88	1982	17	1981
NOV	49.3	1985	36.3	1976	82	1982	-2	1976
DEC	41.1	1984	18.8	1989	80	1982	-21	1989
Annual	57.7	1972	50.0	1976	105	1983	-29	1994
Winter	37.4	1998	22.7	1978	80	1982	-29	1994
Spring	56.1	1977	47.0	1984	93	1982	-10	1980
Summer	75.2	1995	69.6	1976	105	1983	35	1972
Fall	58.1	1985	52.1	1974	100	1983	-2	1976

Precipitation Summary
Normals 1971-2000

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Precip (in)	2.48	2.53	3.26	3.46	4.37	3.44	3.93	3.57	2.85	2.44	2.84	2.71	37.88

Precipitation Extremes Period of Record: 1972-2001

Month	High (in)	Year	Low (in)	Year	1-Day Max (in)	Date
JAN	5.58	1978	0.39	1981	1.95	1982
FEB	5.24	2000	0.38	1978	2.21	2000
MAR	7.10	1997	0.70	1979	1.99	1997
APR	6.57	1998	0.75	1997	2.10	1989
MAY	11.00	1990	1.40	1999	3.01	1990
JUN	7.86	1974	0.55	1988	4.06	1974
JUL	8.67	1980	0.98	1974	2.25	1994
AUG	9.23	1979	0.32	1993	3.98	1990
SEP	7.13	1975	0.40	1985	3.12	1979
OCT	7.46	1983	0.40	1982	2.88	1998
NOV	9.74	1985	0.52	1976	2.04	1985
DEC	8.94	1990	0.77	1976	1.72	1986
Annual	53.97	1990	25.59	1987	4.06	1974
Winter	15.02	1991	2.75	1977	2.21	2000
Spring	17.41	1989	4.73	1986	3.01	1990
Summer	19.51	1979	5.40	1984	4.06	1974
Fall	13.25	1985	3.60	1987	3.12	1979

Snowfall Summary 1972-2000 Averages

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Snow(in)	7.3	4.3	2.9	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.2	17.6

Snowfall Extremes Period of Record: 1972-2001

Month	High (in)	Year	1-Day Max (in)	Date
JAN	28.3	1978	8.0	1978
FEB	12.5	1979	7.0	1985
MAR	9.7	1999	6.0	1993
APR	10.8	1987	7.0	1987
MAY	0.0	-	-	-
JUN	0.0	-	-	-
JUL	0.0	-	-	-
AUG	0.0	-	-	-
SEP	0.0	-	-	-
OCT	1.8	1993	1.5	1993
NOV	4.9	1996	4.0	1984
DEC	9.3	1981	8.0	1984
Season (Jul-Jun)	50.5	1977-1978	8.0	1984

<http://mcc.sws.uiuc.edu/>

2. Fire Season:

Ohio's wildfire seasons occur primarily in the spring (March, April, and May) before vegetation has "greened-up", and the fall (October and November) when leaf drop occurs. During these times and especially when weather conditions are warm, windy and with low humidity, cured vegetation is particularly susceptible to burning.

<http://www.dnr.state.oh.us/forestry/Fire/wildfire.htm>

3. Fuel Type and Characteristics:

Fuels at the park can be divided into three broad categories: grass, timber, and slash. The grass fuel types (short and tall) are primarily located in open fields will be maintained by mowing and prescribed fire. The remainder of the park unit is in forest cover of mixed hardwood. Table 2 identifies the fuel models by vegetation type. The table also correlates the NFDRS and Fire Behavior Prediction System (FBPS) fuel models.

Table 2. Fuel Models by Vegetation Types

VEGETATION	NFDRS FUEL MODEL	FIRE BEHAVIOR FUEL MODEL (FBFM)
Grasses	L/N	1/3
Hardwood Forest	R/E	8/9
Slash	K	11

Deeming, J. & Lancaster, J. & Fosberg, M. & Furman, R. & Schroeder, M. 1972. National Fire Danger Rating System

FBPS Fuel Model 1 is used for short annual or perennial grasses of one foot or less. This represents the pastureland in the park. FBPS fuel model 3 is used for tall grasses averaging 2.5 to 3 feet in height. This fuel model is representative of the prairie in the park.

The FBPS for the timber group is 8/9, where 8 is characterized by closed canopy stands of short-needle conifers or hardwoods that have leafed out. Little undergrowth is present and it is mainly the litter layer that carries the fire. FBPS 9 is typical of the oak-hickory forest stands. These fuel models characterize most of the forested areas of the park.

The slash fuel model, FBPS 11 is for the vegetation debris disposal that accumulates with such activities as maintenance and site clearing. This fuel model will help to identify the expected fire behavior during debris burns.

4. Fire Regime Alteration

Fire has not played a major role in shaping the character of the vegetation of the park and surrounding area since the 1920s. Fire exclusion by aggressive fire control policies has allowed forest succession to progress toward the mixed hardwood climax with woody species encroaching onto abandoned fields.

5. Control Problems

The park is located on gentle sloping ground with some low hills. Farms, individual houses, roads, and other small developments are common throughout the area. While these developments provide frequent breaks in the continuity of fuels and provide good access for

suppression resources, they also increase the values at risk and the probability of an ignition.

Control problems could range from extreme to low depending on site specifics and burning conditions. Under normal fire season conditions, control problems could be expected to be low to moderate.

6. Elements Affecting Management

The wildland urban interface situation is an important consideration for the park. High visitation and use by the public of the park's trails and facilities have the potential to be affected by fire management operations and need to be coordinated to the extent possible. The park is in an EPA Class II airshed, but with the proximity of neighboring residents and vehicle traffic on roads immediately adjacent to the park boundary, smoke from any fire management operation is a primary concern from the standpoint of safety and health. Protection of the park's cultural resources is of paramount importance. Suppression actions may pose a greater threat to these cultural resources than the actual effects of a fire.

7. Fire History

Present park staff report that institutional memory goes back 30 years and there have been no wildland fires within the park during this time. Table 3 shows fire occurrence for the state of Ohio by cause and acreage for 1997, which represents an average year.

Table 3. Calendar Year Wildfire Summary for Ohio (1997)

By cause	Number	Acres
Lightning	5 (1%)	7 (1%)
Campfire	15 (2.5%)	38 (1.5%)
Smoking	15 (2.5%)	38 (1.5%)
Debris Burning	450 (78%)	1665 (68%)
Arson	93 (16%)	689 (28%)

<http://www.dnr.state.oh.us/forestry/Fire/wildstats97.htm>

IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

A. General Implementation Procedures

A wildland fire implementation plan (WFIP) will be initiated for all wildland fires. This plan will provide the framework for determining the appropriate management response. The WFIP Stage I: Initial Fire Assessment will be the responsibility of the incident commander, the Midwest Region fire management office or the park's fire management coordinator. As the park's fire management unit only allows for suppression of unplanned ignitions, the requirement for a decision checklist as a part of the Stage I analysis can be considered met. Subsequently, Stage I analysis may be satisfied at the programmatic level in the FMP through determinations made by combinations of values to be protected and/or fire behavior thresholds. A copy of the WFIP Stage I form can be found in Appendix V.

B. Wildland Fire Suppression

1. Range of Potential Fire Behavior

The fire behavior described below can be expected under average spring and fall fire season conditions. A combination of drought, high wind, low humidity, and high temperatures can greatly increase expected fire behavior.

Fire spread in fire behavior fuel model (FBFM) 1 is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Surface fires are fires that move rapidly through the cured grass and associated material. Generally, fires are of moderate intensity with average rates of spread of 50 to 80 chains/hour and flame lengths of 3 to 4 feet.

Slow-burning surface fires with low flame lengths are generally the case in FBFM 8 as is evidenced by the one-foot flame lengths and average rate of spread of 1.6 chains/hour. Fire is supported in the compact litter layer. This fuel model is typical for winter, spring, and summer periods where fuel compaction and moisture content are primary influences. The fuels pose fire hazards under severe weather conditions involving high temperatures, low humidity, and high winds.

In FBFM 9, fires run through the surface litter faster than model 8 (7.5 chains/hour) and have longer flame lengths (averaging 2.6 feet). Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting from rolling and blowing leaves. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

The slash group, represented by FBFM 11, demonstrates fire behavior that could be fairly active. However, depending on the location of the debris burning area, the shading from the overstory, and the aging of the fine fuels may decrease the fire potential. As the fine fuels burn and intensity builds up, and the larger fuels start burning, active flaming will occur with the potential of generating firebrands. Care should be taken in windy and/or dry conditions to look for spotting problems.

The fire behavior information is taken from BEHAVE (Andrews, 1986).

Table 4. Comparative Rates of Spread and Flame Lengths for Fuel Models

FIRE BEHAVIOR FUEL MODEL	RATE OF SPREAD (Chains/Hour)	FLAME LENGTH (Feet)
1	78	4
3	104	12
8	1.6	1
9	7.5	2.6
11	6	3.5

Andrews, P. 1986. BEHAVE

2. Preparedness Actions

a. Fire Prevention, Community Education and Assistance Programs

An active fire prevention program will be conducted, to the extent possible, in conjunction with other agencies to protect human life and property and prevent damage to cultural resources or physical facilities when conditions warrant.

A program of public education regarding potential fire danger will be implemented when conditions occurring under staffing levels IV or V are reached. The Ohio Department of Natural Resources will provide this information. Visitor contacts, bulletin board materials, handouts, and interpretive programs will be utilized to increase park visitor and neighbor awareness of fire hazards.

It is essential that park employees be well informed about fire prevention and the objectives of the fire management program. Further, employees must be kept informed about changes in existing conditions throughout the fire season.

Trained employees, such as park interpretive staff, need to relate to the public the beneficial effects of prescribed fires as opposed to unplanned human-

caused or natural fires. Information must be included to emphasize the potential severity of human-caused wildfires and how to prevent them.

During periods of extreme or prolonged fire danger, fire prevention messages will be included in interpretive programs. Emergency restrictions regarding fires or area closures may become necessary. When imposed, such restrictions will usually be consistent with those implemented by cooperators.

When prescribed fires are burning in the park, signs at the visitor center and bulletin boards will be used to supplement visitor contacts. These signs will be used to direct, inform, guide, and caution visitors about existing fire conditions and prescribed fire activities.

The park staff will actively work with the Ohio Department of Natural Resources, responding volunteer fire departments other agencies with wildland fire management responsibilities to establish common protocols and procedures, identify training needs, cooperate on prevention, conduct joint training when possible, and develop strategies for safer and more efficient fire management operations.

b. Annual Training Activities

Departmental policy requires that all departmental personnel engaged in wildland fire and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG, 310-1). The DOI incident qualification system meets or exceeds all NWCG standards. The park will conform strictly to the requirements of the NPS wildland fire management qualification and certification system.

The park fire coordinator will be responsible for organizing the training required to meet agency requirements for red-carded firefighters. The park fire coordinator will assist the Midwest Region fire management office by providing a list of red-carded employees to develop needed fire training. When advanced or specialized training is necessary, the park fire coordinator will work through the Midwest Regional Office to obtain funding and enrollment. The Midwest Region fire management office will coordinate the park's fire training needs with those of other nearby parks, cooperating agencies, and the region.

The Midwest Region fire management office will evaluate training needs for park personnel with their input. A priority will be placed on qualifying personnel as Type 1 and 2 firefighter, and incident commander Type 4 and 5. The Midwest Region fire management office will be contacted about needed courses and regional funding for park participation. Park supervisors may be contacted about employee interest in participating in fire suppression.

In addition, during general seasonal orientation, all seasonal personnel should receive instruction in:

- Purpose and objectives of the fire management program.
- Prescribed fire actions conducted and planned.
- Use prescribed fire for vegetation management.
- Public, employee, and firefighter safety during suppression and prescribed fire operations.

c. Annual Readiness Activities

The following outline details the calendar year fire management program for the park. These activities need to be coordinated with the Midwest Region fire management office.

An annual preparedness activity schedule follows:

January:

- Permanent employees' physical fitness exams.
- Update as necessary fire experience and training records for red-carded personnel.
- Submit updated red-carded personnel records and physical fitness scores to the Midwest Region fire management office.
- Archive training and experience records of seasonal personnel.

February-March:

- Meetings with cooperators; final review and revision of interagency agreements.
- Review and coordinate emergency dispatch procedures with the Midwest Region fire management office and the Ohio Interagency Dispatch Center.
- Semi-annual service of any mechanized fire equipment.

- Inventory fire cache and order all necessary fire items to maintain a fully stocked fire cache. Update the inventory list and make sure all equipment is in a fire ready condition.
- Review Step-Up Plan.
- Check established procedure for utilizing suppression and emergency preparedness accounts with the Midwest Region fire management office.
- Update as necessary the fire callout list.
- Meeting or discussion with Midwest Region fire management office to review plans and current program.
- Meeting of appropriate park staff to review approved fire management plan revisions and plan prescribed fire activities.
- Pre-season planning completed; all cooperative agreements revised and in effect.
- Issue red cards to qualified permanent personnel.
- Coordinate fire weather program notification with nearby parks.
- Implement step-up plan and adjust level of readiness in response to changing fire danger levels as necessary.

April:

- Physical fitness testing for seasonal personnel.
- Issue personal protective equipment to seasonal personnel, if necessary.
- Participate in annual seasonal fire training.
- Issue updated fire call-out list to the Midwest Region fire management office, nearby parks, and cooperators as necessary.

May-August:

- Draft FIREPRO budget request and submit to Midwest Region fire management office.
- Post fire danger posters as needed.
- Operate all mechanized fire equipment at least twice a month.

September:

- Meet with finance personnel on status of fire accounts and outstanding fire orders or requisitions if necessary.

October:

- Critique fire season. Evaluate individual performance of the park staff to correct deficiencies and recommend personnel for training as possible.

December:

- Review and revise fire management plan as necessary.
- Review interagency agreements, draft revisions as necessary, and submit to the superintendent for approval.
- Inventory fire cache and requisition replacement equipment and supplies to maintain approved levels.
- Submit proposals for annual training to superintendent for review.
- Forward nominations for interagency fire training to the Midwest Regional Office.
- Meeting of the park staff to review season and formulate program changes.
- Forward outstanding fire reports to Midwest Regional Office.

d. Fire Weather and Fire Danger

Weather Station: The closest weather station is operated by the Ohio Department of Natural Resources, Division of Forestry on parklands, near Chillicothe (station #337301). This station has been in operation since November 2003 and there is insufficient data at this time to compute the weather occurrence percentiles. These percentiles are used to calculate the step up staffing plan and they also cannot be determined at this time.

The Ohio Department of Natural Resources does use the National Fire Danger Rating System or have numerically determined adjective ratings to determine fire danger. The Department of Natural Resources forest officers will notify the park when they determine the fire danger to be high or above. This notification will serve as a trigger point for the park to increase its preparedness and prevention efforts.

4. Initial Attack

a. Priority setting during multiple fire occurrences:

Priorities are indicated on the following maps:

- Vegetative cover map; any fire with continuous fuels up to and across the park boundary or structures.
- Cultural and historic site map.
- Park facility map.

b. Criteria for appropriate initial attack response consistent with GMP/RMP objectives:

- Public and firefighter safety.
- Protection of cultural, historic, and natural resources.
- Protection of improvements and private property.
- Minimum fire-line construction.
- Available suppression resources and response times.
- Fire danger as determined by fuels, weather, and topography.

Aircraft and mechanized equipment will be used only to support above-listed criteria. Charts to assist in determining the appropriate management response are in Appendix M. These charts consider such factors as fire danger, risk, threats, objectives, and time of season, external influences, and complexity.

c. Confinement as a Strategy

Confinement may be used to minimize resource damage and to provide for firefighter safety. A confinement strategy may be selected for initial attack as long as it is not being used primarily to meet resource management objectives. Resource benefits may be a by-product, but the strategy must be based upon the criteria listed above. A confinement strategy may also be selected in the WFSA process when initial attack has failed to contain a wildland fire.

d. Response Times

Response time for initial attack ground resources is approximately one hour or less depending on proximity, accessibility, and other such variables. Extended attack resources should be able to respond in two to six hours depending on proximity and availability. Aviation resources will have the greatest range of response time. This time can vary from two hours to an indefinite period of time depending on seasonality, regional severity, fire priorities, availability, and proximity.

e. Restrictions and Special Concerns

Protection of specific resources requires that constraints on these strategies guide the management of suppression efforts and prescribed fire operations. These constraints include:

- Archaeological resources must be protected. Therefore, dozing, creating firelines, ditching, or other earthwork activities will not take place over known sites, will be evaluated by an archeologist on a case-by-case basis, and must be monitored at all times.
- The only mechanized equipment allowed unless otherwise authorized by the superintendent will be chainsaws, portable and mobile pumps, backpack blowers, fire engines, all terrain vehicles (ATVs), and devices used for heat or fire detection.
- No retardant will be used without the consent of the superintendent.

- No new roads will be created.
- Dead or live standing trees will not be cut unless firefighter, public safety, or suppression actions are compromised.
- Operation of vehicles off existing roads will not be allowed.
- Human-caused fires will require an investigation and report by law enforcement personnel, preferably trained in wildland fire cause investigation.
- In the event of the threat of life or the potential for extensive property damage, the superintendent may amend these constraints.

f. Local Issues

The park depends on local volunteer fire department (VFD) resources for initial and extended attack. Due to the park's configuration, four VFDs are used: Liberty Township, Springfield Township, Twin Township, and Union Township. This close alliance requires that the park work closely with these agencies in planning, training, preparedness, and other fire management issues.

An Ohio Department of Natural Resources, Division of Forestry officer will respond to a fire if requested and in conjunction with the incident commander will decide if additional resources are needed to successfully suppress the fire. If additional resources are needed the Ohio forest officer will order the needed resources through the Ohio Interagency Dispatch Center.

Suppression qualification standards of cooperator fire personnel will be accepted at that entity's standards while under that entity's supervision. Cooperators must meet NWCG standards while under NPS supervision. The closest additional force's dispatch concept will be utilized whenever a wildfire escapes initial attack and threatens to exceed the park's capability to control. In some cases it may be necessary to follow jurisdictional boundaries rather than closest forces.

g. Suppression Equipment

The recommended equipment for fire suppression at the park includes: all necessary personal protective equipment for each qualified person, foam, bladder bags, rakes, leaf blowers, flappers, pumps, hose lays, chain saws, shovels, pulaskis, drip torches, and fuses.

5. Extended Attack and Large Fire Suppression

a. Extended Attack Needs

Extended attack needs will be determined by considering the following:

- Threats to life, property, and park resources.
- Availability of suppression forces.
- Current and expected fire behavior.

b. Implementation Plan Requirements – Wildland Fire Situation Analysis (WFSA) Development

When a wildland fire cannot be controlled during the initial suppression action, the WFIP is considered to have been exceeded. The WFSA is initiated at this stage by the park Chief Ranger. Initiation of the WFSA is also necessary when implementation of a prescribed burn plan is not successful and must be suppressed. The following parameters and considerations will be used in WFSA preparation at Hopewell Culture National Historical Park.

The WFSA is a decision process that employs a systematic and reasonable approach to determine the most appropriate management strategy for a particular situation. Reasonable management alternatives are identified, analyzed, and evaluated, and are consistent with the expected probability of success/consequences of failure. The superintendent shall approve the WFSA and any revisions. Evaluation criteria include firefighter safety, anticipated costs, resource impacts, and social, political, and environmental considerations. The evaluation of alternatives becomes the triggering mechanism for re-evaluation of the WFSA.

Situations that could require selection of a new strategy through the WFSA include but are not limited to:

- Exceeding periodic assessment criteria (i.e. trigger points, air quality);
- Unacceptable risk to firefighter safety, natural or cultural resources, and/or capital improvements;
- Fire leaving or threatening to leave the park boundary;
- Fire exceeds prescribed fire plan; or

- Increasing demand on local and/or national fire management situation or agency administrator prerogative.

A written copy of a WFSA can be found in Appendix N. An electronic version can be found at: <http://www.fs.fed.us/fire/wfsa/>.

c. Incident Management Transition

Transition to an incident management team entails a briefing by the superintendent and a limited delegation of authority for the suppression of the fire(s). The briefing should address agency specific concerns, priorities, firefighter and public safety, economic and resource concerns, and other topics or issues of importance.

d. Delegation of Authority

A delegation of authority from the superintendent to the incident commander is located in Appendix O.

6. Exceeding Wildland Fire Implementation Plan and New Strategy Selection

A wildland fire implementation plan (WFIP) is a progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response. Resource benefit **cannot** be a consideration when selecting the most appropriate management action for suppression fires. An example can be found in Appendix V.

A WFIP has been exceeded when a fire cannot be suppressed during initial attack suppression actions or when a prescribed fire becomes an escaped fire. Then, a wildland fire situation analysis must be developed. When completed, the WFSA will develop a new strategy by which the fire should be managed.

7. Minimum Impact Suppression Tactics (MIST)

The use of MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set - how to suppress a wildfire while minimizing the long-term effects of the suppression action. MIST is the concept of using the minimum tool to safely and effectively accomplish the task. MIST should be considered for application on all fires in all types of land management.

While MIST emphasizes suppressing wildland fire with the least impact to the land, actual fire conditions and good judgment will dictate the actions taken. The incident commander should consider what is necessary to halt fire spread and containment within the fireline or designated perimeter boundary, while safely managing the incident. Use of MIST **will not** compromise firefighter safety or the effectiveness of

suppression efforts. Safety zones and escape routes will be a factor in determining fireline location.

- All fire management activities in the park will rely on tactics that cause a minimum amount of resource damage while maintaining the safety of firefighters, personnel, and the public as the highest priority.
- Superintendent approval is needed for off road use of vehicles, bulldozers, and mechanized equipment.
- Complete minimum impact guidelines are listed in Appendix P.

8. Rehabilitation Guidelines

When a suppression action is taken, rehabilitation may be necessary. On January 19, 2001, the Department of the Interior issued new policies on burned area emergency stabilization and rehabilitation. The specifics of the policy can be found in 620 DM 3 [DOI BAER Policy \(2001\)](#). The most effective rehabilitation measure is prevention of impacts through careful planning and the use of minimum impact suppression tactics.

The incident commander, park archeologist, and park biologist will initiate rehabilitation. Rehabilitation will be directed toward minimizing or eliminating the effects of the suppression effort and reducing the potential damage and hazards caused by the fire:

These actions may include:

- Backfilling of control lines, scarify, and seed with native species.
- Installation of water bars and construction of drain dips on control lines to prevent erosion.
- Installation of check dams to reduce erosion potential in drainages.
- Flush cutting of stumps and camouflaging with soil and moss.
- The placement of cut vegetative materials in random positions.
- Positioning felled and bucked material so as to be least noticeable to visitors and camouflage where possible.
- Restoration of natural ground contours.
- Removal of all flagging, equipment, and litter.

- Complete restoration of camping areas and improved helispots.
- Consideration and planning for more extensive rehabilitation or revegetation to restore sensitive impacted areas.

The biologist will formulate rehabilitation plans for each fire. Rehabilitation efforts should be initiated as soon as they can be safely implemented, which may be before the fire is declared controlled.

Rehabilitation work resulting from suppression actions will be charged to the corresponding suppression account. Rehabilitation work needed to rehabilitate the impacts of the fire will be described in the BAER plan, and will be submitted to the regional BAER coordinator (regional fire ecologist) for approval within one week of the date the fire is declared controlled. BAER project requests totaling \$300,000 or less can be approved by the regional BAER coordinator. Submissions over this amount are reviewed at the regional level and forwarded to the NPS Fire Management Program Center (FMPC) for approval.

9. Records and Reports

The chief ranger is responsible for all fire related records and reports except the WFIP. This responsibility may be delegated to an incoming incident commander for any fire escaping initial attack.

a. Fires

All fires will be sequentially assigned a fire number by calendar year. The incident commander will fill out a DI-1202 (Individual Fire Report) after the fire is declared out. A designated member of the park staff will review all DI-1202's for accuracy and completeness before a copy is mailed to the Midwest Region fire management office. The original will be kept in the park files.

An Individual Fire Report (DI-1202) will be filed by fire number with each year having a separate folder. A complete park report will include the following attachments if applicable:

- Any written policies, guidelines, or authority statements signed by the superintendent.
- Copies of equipment purchase or personnel request orders.
- All situation maps.
- Personnel list (including individual fire fighter time reports) (OF 288).

- Approved prescribed fire plans.
- Fire behavior analyst report/post burn evaluation.
- Press clippings.
- Accident reports.
- All weather data reports and records.
- Burning permits and air quality clearances for prescribed burns.
- Documentation of all financial charges made against the assigned fire account number.
- Superintendent approval for off road use of vehicles, bulldozers, and mechanized equipment.
- Rehabilitation plan.

b. Daily Situation Report

All wildland fires will be closely monitored. The following information will be relayed to the Midwest Region fire management office by 9:30 a.m. (Eastern Standard/Daylight Time) daily for entry into the nationwide fire summary report via the shared applications computer system (SACS). The fire management coordinator will be responsible for contacting the Midwest Region fire management office. Specific applicable information may also need to be provided to Ohio Interagency Dispatch Center:

- Fire name and start date (only for the first day).
- Present fire behavior.
- Estimate of acreage burned in last 24 hours.
- Direction of spread.
- Rate of spread.
- Type of fuels on ground.
- Windspeed, temperature and relative humidity on-site readings.

- Number of personnel and equipment committed to the fire.
- Resources threatened and whether or not actions need to be re-evaluated.
- Cultural resources encountered, affected visibility, archeological, or cultural landscape features.
- Estimated control date.
- Judgment of the ability of local forces to control the fire.
- Determination by Ohio Department of Natural Resources that conditions approximating the BI's 90th percentile or higher and the park moving into staffing class IV and V.

c. Individual Training and Experience

Every employee who has had training or fire experience in the past year will complete an employee master update form. Additional training or experience can be entered into the system at any time. If the training or experience qualifies an individual for additional qualifications, a new red card may be issued. The fire management coordinator will keep the originals and send copies to the Midwest Regional Office for entry into the SACS computer. Those employees who are not in the computer but wish to participate in the fire program will fill out the initial employee master record update form.

C. Wildland Fire Use

The wildland fire use strategy allows naturally occurring fire to burn without suppression action, until the fire no longer meets management goals and objectives. This option was rejected due to the size of the park, the significant degree of wildland urban interface along the park boundary, and the lack of adequate numbers of available qualified personnel required to manage these fires.

D. Prescribed Fire

1. Planning and Documentation

a. Annual Activities for Preparation and Implementation of Program

Prescribed fire will be used infrequently and a long-term plan will be developed when appropriate. An assessment of the approved plan will identify need resources, individual responsibilities, and timelines. These activities include writing prescribed fire (burn) plans, hereafter referred to as

prescribed fire plans, scheduling of resources, coordination with neighboring agencies and communities, and obtaining necessary permits.

b. Long-Term Prescribed Fire Strategy

The purpose of prescribed burning at the park is to protect and preserve the cultural resources of the park, manage vegetation, and reduce fuel loading. The fuels management program would reduce fire hazard by decreasing the potential damage to park resources and adjacent lands and minimizing risks to employees, residents, and visitors. Prescribed fire will be used for research purposes to determine the impact of fire on cultural resources. Prescribed fire objectives will be to:

- Reduce fuel accumulations around neighboring properties and field boundaries.
- Reduce fuel accumulations around developed areas.
- Control natural plant succession to the extent of inhibiting woody growth.
- Promote the growth of native vegetation whenever possible, and control woody/invasive/exotic vegetation.
- Assist with the establishment and maintenance of the desired cultural landscape if appropriate.

c. Needed Personnel

The park does not have sufficient personnel to manage a prescribed fire. Personnel needed for a specific burn will be identified in the project's prescribed fire burn plan. The park will participate with other nearby cooperating agencies in a coordinated approach to mutual prescribed fire programs. Qualified supervisory personnel will be assigned by the Regional Fire Management Office to plan and supervise prescribed fire activities.

d. Fire Weather, Effects, and Behavior Monitoring

Monitoring of prescribed fires at the park is intended to provide information for quantifying and predicting fire behavior and its ecological effects on the park resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather, and fire behavior. In addition, ecological changes such as species composition and vegetation structure will be monitored for several years after a fire. This information will be very useful in adjusting the prescribed fire program to better meet short and long-term resource objectives.

During prescribed fires, monitoring will include mapping, weather, site and fuel measurements, and direct observation of fire characteristics such as flame length, rate of spread, and fire intensity. Operational monitoring provides a check to ensure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions and species composition.

Fire weather and fire behavior will be monitored on all prescribed fires regardless of size. Fire effects on fuels and vegetation will be monitored on a parkwide basis according to NPS standards outlined in the NPS Fire Monitoring Handbook, 2003. The State of Ohio has weather monitoring stations which provide fire managers with warning of changing weather conditions.

The prescribed burn boss will ensure that assigned qualified personnel are used to monitor prescribed fires. The most efficient utilization of personnel for fires of low complexity will be to utilize individuals with diverse experience (ignition, holding, monitoring and monitoring). An efficient and flexible monitoring program is predicated by selection of the appropriate tactics, assessment of their potential and the ability to characterize and quantify the resulting effects to determine if the fire is within prescription and is meeting identified resource goals and objectives.

Fire monitoring support will use protocols with adaptations described in the NPS Fire Monitoring Handbook (Fire Monitoring Handbook 2003) and will be coordinated with the regional fire ecologist.

e. Prescribed Fire Project Critique

The Midwest Regional Office will critique each prescribed fire. A report detailing the prescribed fire burn will accompany any recommendations or changes deemed necessary in the program. This report will be submitted to the superintendent. When appropriate, a post-season critique of the fire management program, including the prescribed fire program, will be held each year by park staff at the conclusion of the fall fire season.

f. Reporting and Documentation Requirements

All prescribed fire forms will be completed as outlined by the prescribed burn boss. A fire monitor will be assigned to collect all predetermined information and complete all necessary forms prior to, during, and after the fire. All records will be archived in the park's fire records for future use and reference.

The park fire coordinator will prepare a final report on the prescribed fire for the superintendent. Information will include a narrative of the fire operation, a determination of whether objectives were met, description of any resources adversely affected and why, weather and fire behavior data, map of the burn area, photographs of the burn, number of work hours, and final cost of the burn.

The forms necessary for documenting prescribed fire activities are outlined in RM-18. The individual fire report (DI-1202) is the responsibility of the park fire coordinator. The case incident report (10-343) is also the responsibility of the park fire coordinator and documents all personnel and equipment costs involved in the burn.

g. Historic Fuel Treatment Map

An historic fuel treatment (prescribed and mechanical) map will be developed and located in Appendix R of this plan.

h. Prescribed Burn Plan Requirements

RM-18 differentiates between the requirements for implementing prescribed fire and debris disposal. For further information see RM-18, Chapter 10. The requirements for prescribed fires and debris disposal are shown below:

The State of Ohio laws prohibit open burning during March, April, May, October, and November. This ban can be waived if there is a certified prescribed fire manager, certified by the State of Ohio managing the prescribed fire. The State of Ohio recognizes NWCG qualifications of prescribed fire burn boss as meeting their criteria, but individuals must complete a form to be listed with State of Ohio as being a certified prescribed fire manager. This form can be obtained from the Ohio Department of Natural Resources, Division of Forestry office in Columbus.

1.) Prescribed Fire

- Original signed prescribed fire plan.
- Checklist of pre-burn prescribed fire activities.
- All reviewer comments.
- All maps.
- Notification checklist.
- Permits such as burn, smoke, etc.

- Monitoring data.
- Weather forecasts.
- Agency administrator go/no-go pre-ignition approval.
- Operational go/no-go checklist.
- Incident action plan(s).
- Unit logs, daily validation or other unit leader documentation.
- Press releases, public comments, and complaints.
- Smoke dispersal information.
- Post fire analysis.
- Individual Fire Report (DI-1202) must be reported in SACS.

2.) Debris Disposal

- Has virtually no chance to exceed the perimeter of the non-wildland environment.
- Will not damage surrounding natural or cultural resources.
- Does not present a safety threat to crewmembers.
- Will not require curtailment during the burning operation.
- Will not require a prescribed fire burn boss or fire-qualified personnel to implement.

2. Exceeding Prescribed Burn Plan

If the prescribed fire escapes the prescribed fire burn unit and immediate efforts at control are not successful, the prescribed fire will be declared a wildland fire and suppressed. A wildland fire situation analysis (WFSA) will be completed and additional personnel and resources ordered as determined by the incident commander. If the fire continues to burn out of control, additional resources will be

called from the local and volunteer fire departments. An incident management team or other non-local resources may be requested to assume command of the fire.

3. Air Quality and Smoke Management

a. Air Quality Issues

- Prescribed fire activities will be in compliance with the Clean Air Act.
- The park is located in a Class II air quality area and is in an attainment area for all EPA nonattainment pollutants.
- An air quality permit is required prior to ignition of any prescribed fire. This permit can be obtained from the Ohio Division of Air Pollution Control office located in Logan, Ohio.

The objective for smoke management and compliance with the Clean Air Act is similar to those for fire management: to encourage a natural process so long as it does not endanger public health and safety. Smoke levels become unacceptable when they diminish visibility to such a degree that they impact public health and safety. As such, the park will evaluate the forecasted impact of smoke on local communities and visitor safety, including the hazard of smoke on roadways. Smoke levels are also unacceptable when they detract from visitor enjoyment of the primary park resource with emphasis on the vistas of the park. Dense smoke within the park is generally unacceptable. However, it may be tolerated for short periods if the winds ensure good mixing. All of these considerations are difficult to quantify, monitor, and evaluate, and there will exist considerable room for discretion.

b. Smoke Mitigation

The park will notify the Ohio Department of Natural Resources as well as surrounding assisting agencies at the time of any fire ignition. The chief ranger will contact the National Weather Service (NWS), Wilmington, Ohio to verify the smoke management forecast, and consult with the state during the initial fire assessment. Thereafter, smoke characteristics will be evaluated daily along with the NWS smoke management forecast during prescribed fires.

To minimize the effects of smoke the following guidelines will be considered when planning a prescribed fire:

- A detailed smoke vector map will be included in every prescribed fire plan to identify sensitive areas and expected directional flow of smoke.
- Burning will be conducted only when: visibility exceeds 5 miles or when the fire weather forecast indicates the presence of an unstable airmass, afternoon mixing heights are 500 meters or greater and ventilation rates (mixing height in meters x transport wind speed in meters per second) is 2000 or greater.
- Local police may be used to mitigate traffic hazards from smoke.
- Smoke Dispersal: Mixing heights equal to or greater than 500 meters.
- Backing and flanking fires will be used if necessary to minimize particulate emissions.
- Stumps, snags, and other hot spots will be mopped-up to reduce residual smoke.
- A fire weather forecast will be obtained from the National Weather Service, Wilmington, Ohio prior to ignition of the prescribed fire.
- Media and other public affairs offices will be kept informed of fire and smoke dispersal conditions throughout the duration of the project.
- The park will provide traffic control, and efforts with local police will be used to mitigate traffic hazards from smoke.

E. Non-Fire Fuels Treatment Applications

1. Mechanical Treatments and Other Applications

a. Annual Activities

The park staff will annually consider proposed mechanical and/or chemical fuels treatment projects for the year. An assessment of the approved project plans will identify needed resources, individual responsibilities, and timelines. These activities may include writing project plans, scheduling of resources, coordination with neighboring agencies and communities, reduction/removal of hazard fuel accumulations nearby developed areas,

field boundaries, and neighboring properties, and obtaining necessary permits. Currently annual activities focus on mowing grasslands and fallow fields once every three years.

b. Equipment and Seasonal Restrictions

The same restrictions apply to mechanical treatments as to prescribed and suppression fires. Off road vehicle or equipment use is prohibited unless the superintendent determines that there is little or no risk to the cultural resources. This determination may be weather dependent.

c. Required Monitoring

Monitor of mechanical treatments is essential to ensure that treatment objectives are being met and that no unwanted effects are occurring. The regional fire ecologist will recommend the recommended levels of monitoring in the monitoring plan (to be developed).

d. Critique Format

The project supervisor will meet with the chief ranger and the biologist to critique the project. Accomplishment of objectives, methodology, cost effectiveness, safety issues, and resource damage are some of the topics to be discussed. A written project completion report incorporating the findings of the critique will be forwarded to the superintendent and the Midwest Region fire management office.

e. Cost Accounting

Individual project costs will be tracked by the park and submitted to the Midwest Region fire management office for review. Expenditures should not exceed the authorized project amount. The park will consult with the MWR FMO in advance if project cost overruns are anticipated.

f. Reporting and Documentation

All project forms will be completed as outlined by the park fire coordinator. A fire monitor will be assigned to collect all predetermined information and complete all necessary forms prior to, during, and after completion of the project. All records will be archived in the park's records future use and reference.

The forms necessary for documenting prescribed fire activities are outlined in NPS Director's Order 18 and Reference Manual 18. The individual fire report (DI-1202), the case incident report (10-343), personnel and equipment costs are the responsibility of the park fire coordinator.

All records will be archived in the park's fire records and the Midwest Region fire management office for future use and reference.

g. Annual Planned Project List

Any division chief may submit proposed projects to the chief ranger, who will compile a list of these projects and submit them to the superintendent for approval and prioritization.

F. Emergency Rehabilitation and Restoration

On January 19, 2001, the Department of the Interior issued new policy on burned area emergency stabilization and rehabilitation. The specifics of the policy can be found in 620 DM 3 [DOI BAER Policy \(2001\)](#). The chief ranger and the supervisory biologist will jointly formulate a rehabilitation plan for each fire.

The burned area emergency rehabilitation plan (BAER) will be submitted to the regional BAER coordinator (regional fire ecologist) for approval within one week of the date the fire is declared controlled. BAER project requests totaling \$300,000 or less can be approved by the regional BAER coordinator. Submissions over this amount are reviewed at the regional level and forwarded to the FMPC for approval.

V. ORGANIZATIONAL AND BUDGETARY PARAMETERS

A. Organizational Structure of Fire Management Program

Various areas of responsibility for implementation of the fire management program at the park are identified by specific park position. There may be instances that the same person functions in two areas of responsibility. The purpose of this section is to clearly define areas of responsibility, provide clear direction and accountability, and further the development of a responsive wildland fire management program.

1. Superintendent

Wildland fire management at the park is the responsibility of the superintendent, with technical duties and accompanying responsibilities delegated to staff members. The superintendent will be responsible for management of the program within Departmental and National Park Service policy, Director's Order 18, Reference Manual 18, and all relevant laws and regulations.

- Ensures that a comprehensive fire management program is adequately planned, staffed, and implemented, and that the fire management plan is reviewed annually and revised as necessary.
- Maintains and facilitates public and media relations pertaining to both suppression and prescribed fire.
- Approves prescribed fire plans.
- Approves of the use of mechanized, ground disturbing equipment, as appropriate.
- Approves staff opportunity to participate in fire activities.
- Provides interested staff training necessary to support the fire program.

2. Acting Superintendent

The acting superintendent is delegated all decision making responsibility when the superintendent is absent from the park.

3. Fire Coordinator

The fire coordinator is a collateral duty assignment of the chief ranger.

- Responsible for the coordination with the incident commander to provide oversight of safe suppression of all wildland fires as well as demobilization and rehabilitation of the burned area.
- Advises and informs the superintendent of all area fire activity information.
- Ensures adequate inventory of equipment and supplies to efficiently implement the fire management program.
- Ensures that both a briefing statement and delegation of authority are prepared for incoming incident management teams.
- In cooperation with the Midwest Region fire management office, coordinates dispatch of park personnel for fire assignments or provides assistance to other parks and agencies. Requisitions fire crews, fire resources, and supplies for use within the park.
- In cooperation with the Midwest Region fire management office, prepares, reviews, and revises cooperative agreements with

interagency cooperators. Maintains liaison with interagency cooperators through annual meetings to review agreements.

- Maintains technical references, maps, and aerial photos for the fire program.
- Responsible for completion of all fire reports (DI-1202s), and coordinates the timely entry of reports into the NPS fire management computer system with the Midwest Region fire management office within 10 days of a fire.
- Prepares necessary evaluation information for each fire, provides timely update of current and predicted fire behavior, and provides technical advice and recommendations to the committee.
- Coordinates and prepares all press releases and will coordinate all public information activities.
- Responsible for oversight of all aspects of the fire management program except research.
- Briefs the superintendent on current and predicted fire management activity.
- Support fire activities by promoting and encouraging the development and issuance of site bulletins and the use of interpretive and educational programs.
- Recommends approval of the fire management plan to the superintendent.
- Ensures that the delegation of authority is consistent with park objectives before submitting for signature by the superintendent.

4. Biologist and Archeologist

- Identifies prescribed fire projects and develops long-term fuels plan in conjunction with the Midwest Regional Office.
- Coordinates fire research efforts, and serves as the primary resource advisor for all fires, both planned and unplanned in conjunction with the regional fire ecologist.
- Recommends approval of the fire management plan to the superintendent.

- Develops resource objectives for prescribed fire in conjunction with the regional fire ecologist.
- Evaluates all plans to ensure resources are not adversely affected or, for cultural resources, cumulative effects do not occur.

5. Chief Ranger

- Provides all law enforcement necessary to support fire activity. This includes evacuation, closures, restrictions and coordination with cooperating law enforcement officials.

6. Midwest Region Fire Management Office

- Ensures the preparation of individual prescribed fire plans in accordance with DO-18 and RM-18, and submits each prescribed fire plan to the superintendent for approval.
- Develops the annual prescribed fire program, including writing prescribed fire plans and conducting approved prescribed fires.
- Reviews park records concerning fire training and fire experience.
- Responsible for submission of park fire situation reports to FMPC.
- Provides expertise and advice at the planning and implementation levels as requested.
- The Midwest Region fire management office will help the park arrange for needed resources and equipment and will assist in preparing FIREPRO funding requests as requested.
- The Midwest Region fire management office may be requested to serve as the agency representative regarding activities with an incident management team.

7. Regional Fire Ecologist

- Recommends appropriate levels of short- and long-term monitoring for prescribed fire and mechanical treatment projects.
- The regional fire ecologist will provide fire ecology expertise and advice at the planning and implementation levels.

B. FIREPRO Funding

The park does not have any FIREPRO funded positions. FIREPRO does fund approved fire and hazard fuel projects. FIREPRO funding is also authorized for approved fire training, preparedness, suppression, equipment, personal protective equipment, and burned area emergency stabilization and rehabilitation projects.

FIREPRO funds are managed through the Midwest Region fire management office. Requests for FIREPRO funding are made from the park to the Midwest Region fire management office.

C. Fire Management Organization in Relation to Park Structure

Although the division of interpretation and visitor and resource protection has overall responsibility for the fire management program, successful implementation requires the cooperative effort of all divisions. The fire management coordinator or the biologist will make any necessary arrangements to secure the use of other divisions' fire qualified personnel. The appropriate division chief or superintendent must approve this request for assistance. The park staff will provide resource advisors for assignment to fires within the park during suppression operations and conduct post-fire research projects as necessary to assess fire effects. Resource advisors may be from cultural resources (archeology, cultural site location, etc.), natural resources (fire effects, suppression techniques, GIS, etc.), and maintenance (equipment availability, utilities, etc.).

D. Wildland Fire Use

This option would allow wildland fires to burn in order to achieve resource management goals. This use of wildland fire was rejected due to the size of the park, the significant degree of wildland urban interface along the park boundary, and the lack of adequate numbers of available qualified personnel required to manage these fires.

E. Interagency Coordination

The park actively works and cooperates with the State of Ohio, Department of Natural Resources, and local volunteer fire departments that have initial attack responsibility. The agreements are verbal and are maintained through periodic meetings, personal contacts, and other forms of communication.

F. Interagency Contacts

Hopewell Culture National Historical Park is actively involved and committed to cooperative agreements and interagency coordination to ensure that the fire management program is implemented in a timely, safe, cost efficient, and professional manner. A list of interagency contacts is listed in Appendix E.

G. Fire Related Agreements

There are no written agreements between the park and any of its cooperators at this time.

VI. MONITORING AND EVALUATION

A. Monitoring Programs

The park will implement long and short term monitoring to assess accomplishments and determine the effects of management activities on cultural and natural resources.

The park will work closely with the regional fire ecologist with all monitoring issues. The regional fire ecologist should be consulted concerning possible future prescribed fire plans with regard to potential fire effects and desired conditions. The fire effects monitors assist the park in establishing and reading vegetation plots.

B. NPS Fire Monitoring Handbook

The Fire Management Handbook (NPS 2003) will serve as the source document providing monitoring needs with minor adaptations made for local situations and conditions.

C. Fire Monitoring Plan

A fire monitoring plan has yet to be developed, but will be located in Appendix F upon completion.

VII. FIRE RESEARCH

A. Previous and Ongoing Research

There has not been any fire research completed at the park. There has been substantial fire research completed for Ohio in the areas of fire effects, occurrence, and vegetation that are relevant and applicable to the park's fire management program.

B. Needed Research

Additional research is needed to more fully understand fire effects on the park's archeological resources. Soil erosion, potential increase in rodent and insect populations

due to increased food supply from new vegetation growth, an increase in microbial activity, and invasive species are all areas of concern.

As the park's fire management plan is implemented and tested, specific research will inevitably be identified for such purposes as refining prescriptions, improving the understanding of fire behavior and fire effects, refining monitoring protocols, describing the impacts on cultural resources, and other information needed for operational fire and resource management. Funding for fire research is available through FIREPRO. The biologist or archeologist, as appropriate, will coordinate any future fire research with the regional fire ecologist.

VIII. PUBLIC SAFETY

A. Public Safety Issues and Concerns

Fire can be hazardous and must be given very high priority during certain conditions. Employees responsible for any wildland fire management action will never subordinate human lives to other values. Ensuring visitor safety will take priority over fire suppression and monitoring activities. All key fire management personnel are red-carded and certified according to National Wildfire Coordinating Group standards. Consistent, accurate monitoring and evaluation of fire behavior in the park will provide the basis for developing contingency plans, contacts, and briefings that ensure public and personnel safety. The superintendent may close all or a portion of the park (including roads and trails) when wildland fire or a prescribed fire pose an imminent threat to public safety. The superintendent may close the park or areas of the park due to fire or high fire danger.

B. Mitigation Safety Procedures

The park will implement and notify visitors of all fire activity through existing communication channels. A fire activity report will be updated as significant changes occur to inform the park personnel of potential fire threat. Areas of fire activity will be clearly signed at visitor centers and park bulletin boards. Residents adjacent to the park will be notified in advance of any prescribed fire and if any fire poses a threat to burn outside the park's boundaries through law enforcement personnel.

IX. PUBLIC INFORMATION AND EDUCATION

A. Public Information Capabilities and Needs

The park is committed to keeping the public informed of its fire management program and activities. Educational opportunities will be developed to reach as many segments of the

public as possible. This may include special interest groups, schools, public organizations, and other groups. Materials and programs exist that will help deliver information concerning the role fire plays in preserving and protecting the cultural and natural resources of the park.

The Midwest Region fire education, prevention, and information specialist is an available resource to the park for consultation and support.

B. Step-Up Public Information Activities

Information and education are important processes in public acceptance of the managed fire program at the park. The superintendent will coordinate all public information activities and will provide the public with accurate information regarding current fire situations and management activities. The public information program will be developed as follows:

- Concepts of the prescribed fire program will be incorporated, as appropriate, in park publications, brochures, and handouts.
- During periods when prescribed fires are ignited handouts will be prepared and distributed to all visitors entering areas of fire activity.
- The fire management program will be incorporated into visitor contacts, interpretive talks, walks, and tour programs. Particular attention will be given when fires are conspicuous from roads or visitor use areas.
- News releases will be distributed to the media as appropriate.
- The public information outlets of neighboring, cooperating agencies, and the regional office will be provided with all fire management information.
- The role of the fire management program at the park will be developed and discussed, as appropriate, in off-site programs and talks.
- The fire management program will be discussed in informal talks with employees of all divisions, concessionaires, contractors, volunteers, residents, and the park's neighbors.

As outlined in the prevention section, emergency closures or restrictions may become necessary during periods of extreme or extended fire danger. Such closures will necessitate additional coordination and communication with the public and the media.

X. PROTECTION OF SENSITIVE RESOURCES

A. Cultural Resources Needing Protection and/or Treatment

Hopewell Culture National Historical Park's archeological and historical resources are a limited, fragile, and nonrenewable part of the environment that must be protected; when disturbed, the scientific information they provide is often lost forever. Public concern for cultural resources protection and preservation is contained in numerous pieces of legislation that have been passed since the Antiquities Act in 1906. Great care will be taken during fire suppression and prescribed fire activities not to destroy or disturb important cultural resources. Although a complete ground survey and inventory with detailed maps of sites, features, and environmental data are the best sources of cultural resources information for fire management planning, archeological and historical site surveys in the park are still incomplete. Completion of these surveys is of the greatest importance.

Soil disturbance will be avoided whenever possible, particularly near archeological sites. Fire management activities that disturb the ground in any way, such as fireline construction using hand tools or heavy equipment, will involve professional archeologists working in cooperation with firefighters and pre-burn crews to prevent needless damage to cultural resources. It must be recognized that during a wildfire the highest priorities are safety and controlling the blaze; if the fireline cannot be diverted, cultural resources may occasionally have to be sacrificed. In most cases, however, damage can be averted. During fire suppression, prescribed fire, and rehabilitation activities:

- Resource base maps showing archeological and historical site locations will be given to archeologist, burn boss, or the incident commander before or during fire management actions.
- When cultural resources are threatened, archeologists will be present to help mitigate the impacts of fire suppression and rehabilitation on cultural resources.
- Priority will be given to monitoring heavy equipment, especially bulldozers and graders, through all aspects of the suppression and rehabilitation efforts.
- Archeologists serving on a fire as technical specialists do not have to hold a current red card to perform their specific advisory duties but will remain in a safe area at all times.
- Line archeologists will be equipped with appropriate standard firefighting safety equipment.

- Special flagging will be used to identify archeological and historical sites.
- A photographic record will be kept of all archeological materials uncovered during fire management and rehabilitation activities.
- The park archeologist will coordinate all activities of line archeologists with the burn boss or the incident commander.

In order to better plan and understand the possible effects of fire on subsurface cultural resources, see the following information on the effect of fire on cultural materials in the ground below and Table 5. Temperatures at which cultural recourse are effected:

700°-800° - Clay particles destroyed; ash aggregates

600°-700° - Pottery will structurally change

500°-600° - Glass damaged; flint and cherts will show water loss

400°-500° – Chemical alteration to bone; no alteration to cultural inorganics with <1/2 hour exposure; no impact to lithics

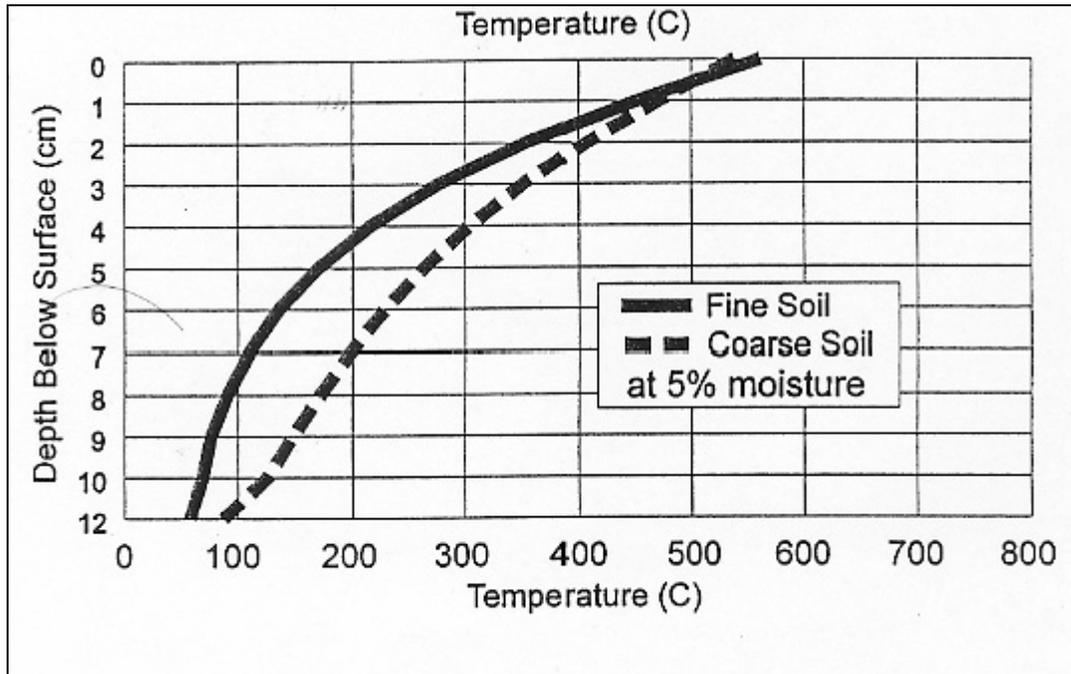
300°-400° – Charing bones; basalt will fracture; organics lost; pollen and grains destroyed; realignment of magnetic signature

200°-300° – Organic matter distilled

<200° – Hides and fibers destroyed

Consultation with the state historic preservation office (SHPO) must be considered if any potential exists to cumulatively or adversely affect any cultural resources and all effects must be evaluated on a case-by-case basis.

Table 5. Ground Temperature and Fire Effects on Cultural Resources



K. Ryan, Fire Sciences Lab, Missoula, MT. Evaluating Fire Effects on Cultural Resources, January 1999

B. Natural Resources Needing Protection and/or Treatment

Minimum impact suppression tactics are the primary procedures for protecting natural resources in the park during suppression activities. All eagle nests, potential Indiana bat habitat, and sensitive plant locations which fall within or in close proximity to prescribed burn units will receive mitigation in prescribed fire burn plans to ensure they are not impacted.

Additional protective measures must be considered as new information emerges from the I&M and vital signs programs.

C. Developments, Infrastructure, and Improvements Needing Protection and/or Treatment

Protection of these resources will involve:

- Increased prevention awareness in these areas.
- Priority for initial attack and aggressive suppression actions in these areas.
- Emphasis on hazard fuel reduction (both prescribed fire and mechanical treatment).

In addition to park capital improvements and values of concern identified in the Resource Management Plan, there are tracts in private ownership some that are improved with residences. These tracts are of special concern for wildland fire suppression and an emphasis for hazard fuel reduction work. Administrative sites and other improvements are to be protected. As funding allows, a defensible space will be maintained around developments, infrastructure, and other improvements in the park.

XI. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

All wildland and prescribed fires occurring in the park will receive, at a minimum, a review by those involved to evaluate such topics as: initial response, control methods used, safety concerns, and the need for new and replacement equipment. In addition to members of the team, the incident commander and/or prescribed burn boss, archeologist, biologist, chief ranger, and other staff members with special knowledge or interest in the particular fire should attend the critique. The purpose of this review is to recognize and document actions that were successful and to identify and rectify actions that were unsafe or ineffective. The critique will document for future reference any recommendations or changes in fire procedures, prescriptions, or needs for additional training to increase program effectiveness and efficiency.

The superintendent or his/her delegate will conduct closeout meetings with incident management teams and fire use teams to ensure a successful transition of the incident back to the park and to identify and evaluate incomplete fire business. Refer to RM-18, Chapter 13, Exhibit 1 for a sample closeout.

A regional or national level fire review may be conducted if one of the following occurs:

- Fire crosses the park boundary onto another jurisdiction without the approval of landowner or agency.
- Fire resulted in adverse media attention.
- Fire involved serious injury or death, significant property damage, or has the potential to do so.
- Fire results in controversy involving another agency.

Refer to RM-18, Chapter 13, Exhibits 2 and 3 for further discussion of fire reviews.

All entrapments and fire shelter deployments will be reported and investigated as soon as possible after the deployment incident. Refer to RM-18, Chapter 13, Exhibit 4 and 5.

The park fire management program will be reviewed on an annual basis by the fire management coordinator to evaluate current procedures and identify any needed changes to the FMP. Specific

information and documentation needed to conduct this review may include: individual fire reports (DI-1202), WFIPs, WFSAs, fire monitoring forms, prescribed burn plans, and individual fire critiques. The park superintendent must approve significant changes to the FMP. The only exceptions to this procedure will include: grammatical corrections, minor procedural changes, deletions, corrections, and additions to the appendices. Copies of all changes will be forward to the Midwest Regional fire management office and the FMPC. Changes requiring approval and concurrence will be submitted with a new cover sheet for signature and dates, which will replace the original cover sheet upon receipt by the superintendent. The fire management plan is subject to formal review every five years.

Prescribed or wildland fires involving an incident management team or significant political, safety, or public issues should be reviewed by the Midwest region fire management office. If a fire generates a major political or public concern, and/or involves multiple serious injuries or a fatality, the FMPC should conduct or participate in the review.

XII. CONSULTATION AND COORDINATION

The chief ranger and the biologist are jointly responsible for coordination and consultation with cooperators regarding fire management activities. Activities include involvement with county fire departments, state forestry and air quality board, nearby federal parks and forests, and the National Weather Service.

The following people were involved in the formulation and preparation of this fire management plan:

Dean Alexander, Superintendent, Hopewell Culture National Historical Park, Chillicothe, Ohio

Fred Bird, Midwest Region Fire Management Officer, Omaha, Nebraska

Scott Beacham, Midwest Region Fuels Management Specialist, Omaha, Nebraska

Mike Bowden, Fire Supervisor, Division of Forestry, Ohio Department of Natural Resources, Columbus, Ohio

Jim DeCoster, Midwest Region Fire Ecologist, Omaha, Nebraska

Jim Mattingly, Midwest Region Wildland Fire Management Specialist, Omaha, Nebraska

Dan O'Brien, Wildland Fire Associates, Central Point, Oregon

Rod O'Sullivan, Midwest Region, NEPA Specialist, Omaha, Nebraska

Department of the Interior
National Park Service

Hopewell Culture National Historical Park
Wildland Fire Management Plan

Jennifer Pederson, Archeologist, Hopewell Culture National Historical Park, Chillicothe,
Ohio

Myra Vick, Biologist, Hopewell Culture National Historical Park, Chillicothe, Ohio

XIII. APPENDIX

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Idaho.

B. Definitions

National Fire Plan

A

Aerial Fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

Aerial Ignition: Ignition of fuels by dropping incendiary devices or materials from aircraft.

Air Tanker: A fixed-wing aircraft equipped to drop fire retardants or suppressants.

Agency: Any federal, state, or county government organization participating with jurisdictional responsibilities.

Anchor Point: An advantageous location, usually a barrier to fire spread, from which to start building a fire line. An anchor point is used to reduce the chance of firefighters being flanked by fire.

Aramid: The generic name for a high-strength, flame-resistant synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.

Aspect: Direction toward which a slope faces.

B

Backfire: A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the fire's convection column.

Backpack Pump: A portable sprayer with hand-pump, fed from a liquid-filled container fitted with straps, used mainly in fire and pest control. (See also Bladder Bag.)

Bambi Bucket: A collapsible bucket slung below a helicopter. Used to dip water from a variety of sources for fire suppression.

Behave: A system of interactive computer programs for modeling fuel and fire behavior that consists of two systems: BURN and FUEL.

Bladder Bag: A collapsible backpack portable sprayer made of neoprene or high-strength nylon fabric fitted with a pump. (See also Backpack Pump.)

Blow-up: A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a firestorm. (See Flare-up.)

Brush: A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees, usually of a type undesirable for livestock or timber management.

Brush Fire: A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Bucket Drops: The dropping of fire retardants or suppressants from specially designed buckets slung below a helicopter.

Buffer Zones: An area of reduced vegetation that separates wildlands from vulnerable residential or business developments. This barrier is similar to a greenbelt in that it is usually used for another purpose such as agriculture, recreation areas, parks, or golf courses.

Bump-up Method: A progressive method of building a fire line on a wildfire without changing relative positions in the line. Work is begun with a suitable space between workers. Whenever one worker overtakes another, all workers ahead move one space forward and resume work on the uncompleted part of the line. The last worker does not move ahead until completing his or her space.

Burn Out: Setting fire inside a control line to widen it or consume fuel between the edge of the fire and the control line.

Burning Ban: A declared ban on open air burning within a specified area, usually due to sustained high fire danger.

Burning Conditions: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

Burning Index: An estimate of the potential difficulty of fire containment as it relates to the flame length at the most rapidly spreading portion of a fire's perimeter.

Burning Period: That part of each 24-hour period when fires spread most rapidly, typically from 10:00 a.m. to sundown.

C

Campfire: As used to classify the cause of a wildland fire, a fire that was started for cooking or warming that spreads sufficiently from its source to require action by a fire control agency.

Candle or Candling: A single tree or a very small clump of trees that is burning from the bottom up.

Chain: A unit of linear measurement equal to 66 feet.

Closure: Legal restriction, but not necessarily elimination of specified activities such as smoking, camping, or entry that might cause fires in a given area.

Cold Front: The leading edge of a relatively cold air mass that displaces warmer air. The heavier cold air may cause some of the warm air to be lifted. If the lifted air contains enough moisture, the

result may be cloudiness, precipitation, and thunderstorms. If both air masses are dry, no clouds may form. Following the passage of a cold front in the Northern Hemisphere, westerly or northwesterly winds of 15 to 30 or more miles per hour often continue for 12 to 24 hours.

Cold Trailing: A method of controlling a partly dead fire edge by carefully inspecting and feeling with the hand for heat to detect any fire, digging out every live spot, and trenching any live edge.

Command Staff: The command staff consists of the information officer, safety officer, and liaison officer. They report directly to the incident commander and may have assistants.

Complex: Two or more individual incidents located in the same general area, which are assigned to a single incident commander or unified command.

Contain a fire: A fuel break around the fire has been completed. This break may include natural barriers or manually and/or mechanically constructed line.

Control a fire: The complete extinguishment of a fire, including spot fires. Fireline has been strengthened so that flare-ups from within the perimeter of the fire will not break through this line.

Control Line: All built or natural fire barriers and treated fire edge used to control a fire.

Cooperating Agency: An agency supplying assistance other than direct suppression, rescue, support, or service functions to the incident control effort; e.g., Red Cross, law enforcement agency, telephone company, etc.

Coyote Tactics: A progressive line construction duty involving self-sufficient crews that build fire line until the end of the operational period, remain at or near the point while off duty, and begin building fire line again the next operational period where they left off.

Creeping Fire: Fire burning with a low flame and spreading slowly.

Crew Boss: A person in supervisory charge of usually 16 to 21 firefighters and responsible for their performance, safety, and welfare.

Crown Fire (Crowning): The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Curing: Drying and browning of herbaceous vegetation or slash.

D

Dead Fuels: Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

Debris Burning: A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Defensible Space: An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.

Deployment: See Fire Shelter Deployment.

Detection: The act or system of discovering and locating fires.

Direct Attack: Any treatment of burning fuel, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

Dispatch: The implementation of a command decision to move a resource or resources from one place to another.

Dispatcher: A person employed who receives reports of discovery and status of fires, confirms their locations, takes action promptly to provide people and equipment likely to be needed for control in first attack, and sends them to the proper place.

Dispatch Center: A facility from which resources are directly assigned to an incident.

Division: Divisions are used to divide an incident into geographical areas of operation. Divisions are established when the number of resources exceeds the span-of-control of the operations chief. A division is located with the incident command system organization between the branch and the task force/strike team.

Dozer: Any tracked vehicle with a front-mounted blade used for exposing mineral soil.

Dozer Line: Fire line constructed by the front blade of a dozer.

Drip Torch: Hand-held device for igniting fires by dripping flaming liquid fuel on the materials to be burned; consists of a fuel fount, burner arm, and igniter. Fuel used is generally a mixture of diesel and gasoline.

Drop Zone: Target area for air tankers, helitankers, and cargo dropping.

Drought Index: A number representing net effect of evaporation, transpiration, and precipitation in producing cumulative moisture depletion in deep duff or upper soil layers.

Dry Lightning Storm: Thunderstorm in which negligible precipitation reaches the ground. Also called a dry storm.

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, leaves, and immediately above the mineral soil.

E

Energy Release Component (ERC): The computed total heat released per unit area (British thermal units per square foot) within the fire front at the head of a moving fire.

Engine: Any ground vehicle providing specified levels of pumping, water, and hose capacity.

Engine Crew: Firefighters assigned to an engine. The Fireline Handbook defines the minimum crew makeup by engine type.

Entrapment: A situation where personnel are unexpectedly caught in a fire behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose. These situations may or may not result in injury. They include "near misses."

Environmental Assessment (EA): EAs were authorized by the National Environmental Policy Act (NEPA) of 1969. They are concise, analytical documents prepared with public participation that determine if an environmental impact statement (EIS) is needed for a particular project or action. If an EA determines an EIS is not needed, the EA becomes the document allowing agency compliance with NEPA requirements.

Environmental Impact Statement (EIS): EISs were authorized by the National Environmental Policy Act (NEPA) of 1969. Prepared with public participation, they assist decision makers by providing information, analysis, and an array of action alternatives allowing managers to see the probable effects of decisions on the environment. Generally, EISs are written for large-scale actions or geographical areas.

Equilibrium Moisture Content: Moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle reaches equilibrium moisture content, net exchange of moisture between it and the environment is zero.

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area, such as an already burned area, previously constructed safety area, a meadow that won't burn, or natural rocky area that is large enough to take refuge without being burned. When escape routes deviate from a defined physical path, they should be clearly marked (flagged).

Escaped Fire: A fire that has exceeded or is expected to exceed initial attack capabilities or prescription.

Extended Attack Incident: A wildland fire that has not been contained or controlled by initial attack forces, and for which more firefighting resources are arriving, en route, or being ordered by the initial attack incident commander.

Extreme Fire Behavior: "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, and strong convection

column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

F

Faller: A person who fells trees. Also called a sawyer or cutter.

Field Observer: Person responsible to the situation unit leader for collecting and reporting information about an incident obtained from personal observations and interviews.

Fine (Light) Fuels: Fast-drying fuels, generally with comparatively high surface area-to-volume ratios, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fingers of a Fire: The long narrow extensions of a fire projecting from the main body.

Fire Behavior: The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Forecast: Prediction of probable fire behavior, usually prepared by a fire behavior officer, in support of fire suppression or prescribed burning operations.

Fire Behavior Specialist: A person responsible to the planning section chief for establishing a weather data collection system and for developing fire behavior predictions based on fire history, fuel, weather, and topography.

Fire Break: A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

Fire Cache: A supply of fire tools and equipment assembled in planned quantities or standard units at a strategic point for exclusive use in fire suppression.

Fire Crew: An organized group of firefighters under the leadership of a crew leader or other designated official.

Fire Front: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

Fire Intensity: A general term relating to the heat energy released by a fire.

Fire Line: A linear fire barrier that is scraped or dug to mineral soil.

Fire Load: The number and size of fires historically experienced on a specified unit over a specified period (usually one day) at a specified index of fire danger.

Fire Management Plan (FMP): A strategic plan that defines a program to manage wildland and prescribed fires, and documents the fire management program in the approved land use plan. The

plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Fire Perimeter: The entire outer edge or boundary of a fire.

Fire Season: 1) Period(s) of the year during which wildland fires are likely to occur, spread, and affect resource values sufficient to warrant organized fire management activities. 2) A legally enacted time during which burning activities is regulated by state or local authority.

Fire Shelter: An aluminized tent offering protection by means of reflecting radiant heat and providing a volume of breathable air in a fire entrapment situation. Fire shelters should only be used in life-threatening situations, as a last resort.

Fire Shelter Deployment: The removing of a fire shelter from its case and using it as protection against fire.

Fire Storm: Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Use Module (Prescribed Fire Module): A team of skilled and mobile personnel dedicated primarily to prescribed fire management. These are national and interagency resources, available throughout the prescribed fire season, that can ignite, hold, and monitor prescribed fires.

Fire Weather: Weather conditions that influence fire ignition, behavior, and suppression.

Fire Weather Watch: A term used by fire weather forecasters to notify using agencies, usually 24 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

Fire Whirl: Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to more than 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

Firefighting Resources: All people and major items of equipment that can or potentially could be assigned to fires.

Flame Height: The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flaming Front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Flanks of a Fire: The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Flare-up: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Flash Fuels: Fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash that ignite readily and are consumed rapidly when dry. Also called fine fuels.

Forb: A plant with a soft, rather than permanent woody stem, that is not a grass or grass-like plant.

Fuel: Combustible material. Includes vegetation, such as grass, leaves, ground litter, plants, shrubs and trees that feed a fire. (See Surface Fuels.)

Fuel Bed: An array of fuels usually constructed with specific loading, depth and particle size to meet experimental requirements; also, commonly used to describe the fuel composition in natural settings.

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Model: Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Fuel Moisture (Fuel Moisture Content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Fuel Reduction: Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Fusee: A colored flare designed as a railway-warning device and widely used to ignite suppression and prescription fires.

G

General Staff: The group of incident management personnel reporting to the incident commander. They may each have a deputy, as needed. Staff consists of operations section chief, planning section chief, logistics section chief, and finance/administration section chief.

Geographic Area: A political boundary designated by the wildland fire protection agencies, where these agencies work together in coordination and effective utilization.

Ground Fuel: All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame.

H

Haines Index: An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire.

Hand Line: A fireline built with hand tools.

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Head of a Fire: The side of the fire having the fastest rate of spread.

Heavy Fuels: Fuels of large diameter such as snags, logs, and large limb wood that ignite and are consumed more slowly than flash fuels.

Helibase: The main location within the general incident area for parking, fueling, maintaining, and loading helicopters. The helibase is usually located at or near the incident base.

Helispot: A temporary landing spot for helicopters.

Helitack: The use of helicopters to transport crews, equipment, and fire retardants or suppressants to the fire line during the initial stages of a fire.

Helitack Crew: A group of firefighters trained in the technical and logistical use of helicopters for fire suppression.

Holding Actions: Planned actions required to achieve wildland prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions.

Holding Resources: Firefighting personnel and equipment assigned to do all required fire suppression work following fireline construction but generally not including extensive mop-up.

Hose Lay: Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

Hotshot Crew: A highly trained fire crew used mainly to build fireline by hand.

Hotspot: A particular active part of a fire.

Hotspotting: Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

I

Incident: A human-caused or natural occurrence, such as wildland fire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

Incident Action Plan (IAP): Contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map.

Incident Command Post (ICP): Location at which primary command functions are executed. The ICP may be co-located with the incident base or other incident facilities.

Incident Command System (ICS): The combination of facilities, equipment, personnel, procedure and communications operating within a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Incident Commander: Individual responsible for the management of all incident operations at the incident site.

Incident Management Team: The incident commander and appropriate general or command staff personnel assigned to manage an incident.

Incident Objectives: Statements of guidance and direction necessary for selection of appropriate strategy (ies), and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed.

Infrared Detection: The use of heat sensing equipment, known as infrared scanners, for detection of heat sources that are not visually detectable by the normal surveillance methods of either ground or air patrols.

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

J

Job Hazard Analysis: This analysis of a project is completed by staff to identify hazards to employees and the public. It identifies hazards, corrective actions, and the required safety equipment to ensure public and employee safety.

Jump Spot: Selected landing area for smokejumpers.

Jump Suit: Approved protection suit worn by smokejumpers.

K

Keech Byram Drought Index (KBDI): Commonly used drought index adapted for fire management applications, with a numerical range from 0 (no moisture deficiency) to 800 (maximum drought).

Knock Down: To reduce the flame or heat on the more vigorously burning parts of a fire edge.

L

Ladder Fuels: Fuels that provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Large Fire: 1) For statistical purposes, a fire burning more than a specified area of land e.g., 300 acres. 2) A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

Lead Plane: Aircraft with pilot used to make dry runs over the target area to check wind and smoke conditions, topography, and to lead air tankers to targets and supervise their drops.

Light (Fine) Fuels: Fast-drying fuels, generally with comparatively high surface area-to-volume ratios, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Lightning Activity Level (LAL): A number, on a scale of 1 to 6, which reflects frequency and character of cloud-to-ground lightning. The scale is exponential, based on powers of 2 (i.e., LAL 3 indicates twice the lightning of LAL 2).

Line Scout: A firefighter who determines the location of a fire line.

Litter: Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Live Fuels: Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

M

Micro-Remote Environmental Monitoring System (Micro-REMS): Mobile weather monitoring station. A Micro-REMS usually accompanies an incident meteorologist and ATMU to an incident.

Mineral Soil: Soil layers below the predominantly organic horizons; soil with little combustible material.

Mobilization: The process and procedures used by all organizations, federal, state and local for activating, assembling, and transporting all resources that have been requested to respond to or support an incident.

Modular Airborne Firefighting System (MAFFS): A manufactured unit consisting of five interconnecting tanks, a control pallet, and a nozzle pallet, with a capacity of 3,000 gallons, designed to be rapidly mounted inside an unmodified C-130 (Hercules) cargo aircraft for use in dropping retardant on wildland fires.

Mop-up: To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material along or near the control line, felling snags, or moving logs so they won't roll downhill.

Multi-Agency Coordination (MAC): A generalized term which describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents, and the sharing and use of critical resources. The MAC organization is not a part of the on-scene ICS and is not involved in developing incident strategy or tactics.

Mutual Aid Agreement: Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.

N

National Environmental Policy Act (NEPA): NEPA is the basic national law for protection of the environment, passed by Congress in 1969. It sets policy and procedures for environmental protection, and authorizes environmental impact statements and environmental assessments to be used as analytical tools to help federal managers make decisions.

National Fire Danger Rating System (NFDRS): A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

National Wildfire Coordinating Group: A group formed under the direction of the Secretaries of Agriculture and the Interior and comprised of representatives of the U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, and Association of State Foresters. The group's purpose is to facilitate coordination and

effectiveness of wildland fire activities and provide a forum to discuss, recommend action, or resolve issues and problems of substantive nature. NWCG is the certifying body for all courses in the National Fire Curriculum.

Nomex ®: Trade name for a fire resistant synthetic material used in the manufacturing of flight suits, pants, and shirts used by firefighters (see Aramid).

Normal Fire Season: 1) A season when weather, fire danger, and number and distribution of fires are about average. 2) Period of the year that normally comprises the fire season.

O

Operations Branch Director: Person under the direction of the operations section chief who is responsible for implementing that portion of the incident action plan appropriate to the branch.

Operational Period: The period of time scheduled for execution of a given set of tactical actions as specified in the incident action plan. Operational periods can be of various lengths, although usually not more than 24 hours.

Overhead: People assigned to supervisory positions, including incident commanders, command staff, general staff, directors, supervisors, and unit leaders.

P

Pack Test: Used to determine the aerobic capacity of fire suppression and support personnel, and assign physical fitness scores. The test consists of walking a specified distance, with or without a weighted pack, in a predetermined period of time, with altitude corrections.

Paracargo: Anything dropped, or intended for dropping, from an aircraft by parachute, by other retarding devices, or by free fall.

Peak Fire Season: That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

Personnel Protective Equipment (PPE): All firefighting personnel must be equipped with proper equipment and clothing in order to mitigate the risk of injury from, or exposure to, hazardous conditions encountered while working. PPE includes, but is not limited to: 8-inch high-laced leather boots with lug soles, fire shelter, hard hat with chin strap, goggles, ear plugs, aramid shirts and trousers, leather gloves, and individual first aid kits.

Preparedness: Condition or degree of being ready to cope with a potential fire situation

Prescribed Fire: Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescribed Fire Plan (Burn Plan): This document provides the prescribed burn boss information needed to implement an individual prescribed fire project.

Prescription: Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, and environmental, geographic, administrative, social, or legal considerations.

Prevention: Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards.

Project Fire: A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.

Pulaski: A combination chopping and trenching tool, which combines a single-bitted axe-blade with a narrow adze-like trenching blade fitted to a straight handle. Useful for grubbing or trenching in duff and matted roots. Well-balanced for chopping.

R

Radiant Burn: A burn received from a radiant heat source.

Radiant Heat Flux: The amount of heat flowing through a given area in a given time, usually expressed as calories/square centimeter/second.

Rappelling: Technique of landing specifically trained firefighters from hovering helicopters; involves sliding down ropes with the aid of friction-producing devices.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Reburn: The burning of an area that has been previously burned but that contains flammable fuel that ignites when burning conditions are more favorable; an area that has reburned.

Red Card: Fire qualification card issued to fire rated persons showing their training needs and their qualifications to fill specified fire suppression and support positions in a large fire suppression or incident organization.

Red Flag Warning: Term used by fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern.

Rehabilitation: The activities necessary to repair damage or disturbance caused by wildland fires or the fire suppression activity.

Relative Humidity (RH): The ratio of the amount of moisture in the air, to the maximum amount of moisture that air would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure.

Remote Automatic Weather Station (RAWS): An apparatus that automatically acquires, processes, and stores local weather data for later transmission to the GOES Satellite, from which the data is re-transmitted to an earth-receiving station for use in the National Fire Danger Rating System.

Resources: 1) Personnel, equipment, services, and supplies available, or potentially available, for assignment to incidents. 2) The natural resources of an area, such as timber, grass, watershed values, recreation values, and wildlife habitat.

Resource Management Plan (RMP): A document prepared by field office staff with public participation, and approved by field office managers that provides general guidance and direction for land management activities at a field office. The RMP identifies the need for fire in a particular area and for a specific benefit.

Resource Order: An order placed for firefighting or support resources.

Retardant: A substance or chemical agent that reduces the flammability of combustibles.

Run (of a fire): The rapid advance of the head of a fire with a marked change in fire line intensity and rate of spread from that noted before and after the advance.

Running: A rapidly spreading surface fire with a well-defined head.

S

Safety Zone: An area cleared of flammable materials used for escape in the event the line is outflanked, or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas, which can be used with relative safety by firefighters and their equipment in the event of a blowup in the vicinity.

Scratch Line: An unfinished preliminary fire line hastily established or built as an emergency measure to check the spread of fire.

Severity Funding: Funds provided to increase wildland fire suppression response capability necessitated by abnormal weather patterns, extended drought, or other events causing abnormal increase in the fire potential and/or danger.

Single Resource: An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work supervisor that can be used on an incident.

Size-up: To evaluate a fire to determine a course of action for fire suppression.

Slash: Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps, and broken understory trees or brush.

Sling Load: Any cargo carried beneath a helicopter and attached by a lead line and swivel.

Slop-over: A fire edge that crosses a control line or natural barrier intended to contain the fire.

Smokejumper: A firefighter who travels to fires by aircraft and parachute.

Smoke Management: Application of fire intensities and meteorological processes to minimize degradation of air quality during prescribed fires.

Smoldering Fire: A fire burning without flame and barely spreading.

Snag: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Spark Arrester: A device installed in a chimney, flue, or exhaust pipe to stop the emission of sparks and burning fragments.

Spot Fire: A fire ignited outside the perimeter of the main fire by flying sparks or embers.

Spot Weather Forecast: A special forecast issued to fit the time, topography, and weather of each specific fire. These forecasts are issued upon request of the user agency and are more detailed, timely, and specific than zone forecasts.

Spotter: In smokejumping, the person responsible for selecting drop targets and supervising all aspects of dropping smokejumpers.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Staging Area: Locations set up at an incident where resources can be placed while awaiting a tactical assignment on a three-minute available basis. Staging areas are managed by the operations section.

Strategy: The science and art of command as applied to the overall planning and conduct of an incident.

Strike Team: Specified combinations of the same kind and type of resources, with common communications, and a leader.

Strike Team Leader: Person responsible to a division/group supervisor for performing tactical assignments given to the strike team.

Structure Fire: Fire originating in and burning any part or all of any building, shelter, or other structure.

Suppressant: An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when direction applied to burning fuels.

Suppression: All the work of extinguishing or containing a fire, beginning with its discovery.

Surface Fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Swamper: (1) A worker who assists fallers and/or sawyers by clearing away brush, limbs and small trees. Carries fuel, oil, and tools, and watches for dangerous situations. (2) A worker on a dozer crew who pulls winch line, helps maintain equipment, etc., to speed suppression work on a fire.

T

Tactics: Deploying and directing resources on an incident to accomplish the objectives designated by strategy.

Temporary Flight Restrictions (TFR): A restriction requested by an agency and put into effect by the Federal Aviation Administration in the vicinity of an incident, which restricts the operation of nonessential aircraft in the airspace around that incident.

Terra Torch ®: Device for throwing a stream of flaming liquid, used to facilitate rapid ignition during burn out operations on a wildland fire or during a prescribed fire operation.

Test Fire: A small fire ignited within the planned burn unit to determine the characteristic of the prescribed fire, such as fire behavior, detection performance, and control measures.

Timelag: Time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four timelag periods.

Torching: The ignition and flare-up of a tree or small group of trees, usually from bottom to top.

Two-way Radio: Radio equipment with transmitters in mobile units on the same frequency as the base station, permitting conversation in two directions using the same frequency in turn.

Type: The capability of a firefighting resource in comparison to another type. Type 1 usually means a greater capability due to power, size, or capacity.

U

Uncontrolled Fire: Any fire that threatens to destroy life, property, or natural resources,

Underburn: A fire that consumes surface fuels but not trees or shrubs. (See Surface Fuels.)

V

Vectors: Directions of fire spread as related to rate of spread calculations (in degrees from upslope).

Volunteer Fire Department (VFD): A fire department of which some or all members are unpaid.

W

Water Tender: A ground vehicle capable of transporting specified quantities of water.

Weather Information and Management System (WIMS): An interactive computer system designed to accommodate the weather information needs of all federal and state natural resource management agencies. Provides timely access to weather forecasts, current and historical weather data, the National Fire Danger Rating System (NFDRS), and the National Interagency Fire Management Integrated Database (NIFMID).

Wet Line: A line of water, or water and chemical retardant, sprayed along the ground, that serves as a temporary control line from which to ignite or stop a low-intensity fire.

Wildland Fire: Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Implementation Plan (WFIP): A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits.

Wildland Fire Situation Analysis (WFSA): A decision-making process that evaluates alternative suppression strategies against selected environmental, social, political, and economic criteria. Provides a record of decisions.

Wildland Fire Use: The management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outlined in fire management plans.

Wildland Urban Interface: The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Wind Vectors: Wind directions used to calculate fire behavior.

C. Fauna and Flora Species List

The species lists include herpetological, bird, mammal, and plant species. There is no fish inventory for Hopewell Culture National Historical Park.

Herpetological species found within Hopewell Culture National Historical Park through I&M program.

	ORDER	FAMILY	SPECIES
1.	Anura	Bufonidae	American toad (<i>Bufo americanus</i>)
2.			Fowler's toad (<i>Bufo fowleri</i>)
3.		Hylidae	Cope's gray treefrog (<i>Hyla chrysocelis</i>)/ gray tree frog (<i>Hyla versicolor</i>).
4.			spring peeper (<i>Pseudacris crucifer</i>)
5.		Ranidae	northern leopard frog (<i>Rana pipiens</i>)
6.			American bullfrog (<i>Rana catesbeiana</i>)
7.			green frog (<i>Rana clamitans melanota</i>)
8.	Caudata	Salamandridae	red-spotted newt (<i>Notophthalmus viridescens</i>)
9.		Plethodontidae	northern two-lined salamander (<i>Eurycea bislineata</i>)
10.			northern ravine salamander (<i>Plethodon electromorphus</i>)
11.			redback salamander (<i>Plethodon cinereus</i>)
12.		Ambystomatidae	Jefferson salamander (<i>Ambystoma jeffersonianum</i>)

Bird species observed within Hopewell Culture National Historical Park through I&M program.

<u>Scientific Name</u>	<u>Common Name</u>
1. <i>Accipiter striatus</i>	Sharp-shinned hawk
2. <i>Agelaius phoeniceus</i>	Red-winged blackbird
3. <i>Ammodramus savannarum</i> *	Grasshopper sparrow
4. <i>Anas platyrhynchos</i>	Mallard
5. <i>Ardea herodias</i>	Great blue heron
6. <i>Bombycilla cedrorum</i>	Cedar waxwing
7. <i>Branta canadensis</i>	Canada goose
8. <i>Cardinalis cardinalis</i>	Northern cardinal
9. <i>Carduelis tristis</i>	American goldfinch
10. <i>Cathartes aura</i>	Turkey vulture
11. <i>Charadrius vociferus</i>	Killdeer
12. <i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo

<u>Scientific Name</u>	<u>Common Name</u>
13. <i>Colaptes auratus</i>	Northern flicker
14. <i>Columba livia</i>	Rock dove
15. <i>Contopus virens</i>	Eastern Wood-peewee
16. <i>Corvus brachyrhynchos</i>	American crow
17. <i>Cyanocitta cristata</i>	Blue jay
18. <i>Dryocopus pileatus</i>	Pileated woodpecker
19. <i>Dumetella carolinensis</i>	Gray catbird
20. <i>Empidonax flaviventris</i>	Yellow-bellied flycatcher
21. <i>Geothlypis trichas</i>	Common yellowthroat
22. <i>Hylocichla mustelina</i>	Wood thrush
23. <i>Icteria virens</i>	Yellow-breasted chat
24. <i>Icterus spurius</i>	Orchard oriole
25. <i>Melanerpes carolinus</i>	Red-bellied Woodpecker
26. <i>Melospiza melodia</i>	Song sparrow
27. <i>Mimus polyglottos</i>	Northern mockingbird
28. <i>Parus bicolor</i>	Tufted titmouse
29. <i>Parus carolinensis</i>	Carolina chickadee
30. <i>Passer domesticus</i>	House sparrow
31. <i>Passerina cyanea</i>	Indigo bunting
32. <i>Phasianus colchicus</i>	Ring-necked Pheasant
33. <i>Pipilo erythrophthalmus</i>	Eastern Towhee
34. <i>Piranga olivacea</i>	Scarlet tanager
35. <i>Protonotaria citrea</i>	Prothonotary warbler
36. <i>Quiscalus quiscula</i>	Common grackle
37. <i>Seiurus aurocapillus</i>	Ovenbird
38. <i>Sialia sialis</i>	Eastern bluebird
39. <i>Sitta carolinensis</i>	White-breasted Nuthatch
40. <i>Spiza americana</i> *	Dickcissel
41. <i>Spizella passerina</i>	Chipping sparrow
42. <i>Spizella pusilla</i>	Field sparrow
43. <i>Sturnella magna</i> *	Eastern meadowlark
44. <i>Sturnus vulgaris</i>	European starling
45. <i>Tachycineta bicolor</i>	Tree swallow
46. <i>Thryothorus ludovicianus</i>	Carolina wren
47. <i>Turdus migratorius</i>	American robin

	<u>Scientific Name</u>	<u>Common Name</u>
48.	<i>Vireo olivaceus</i>	Red-eyed Vireo
49.	<i>Zenaida macroura</i>	Mourning dove

Mammal species observed within Hopewell Culture National Historical Park through I&M program.

	<u>Scientific Name</u>	<u>Common</u>
1.	<i>Odocoileus virginianus</i>	White-tailed deer
2.	<i>Mephitis mephitis</i>	Striped skunk
3.	<i>Mustela nivalis</i>	Least weasel
4.	<i>Procyon lotor</i>	Raccoon
5.	<i>Blarina brevicauda</i>	Short-tailed shrew
6.	<i>Cryptotis parva</i>	Least shrew
7.	<i>Sorex cinereus</i>	Masked shrew
8.	<i>Sylvilagus floridanus</i>	Eastern cottontail
9.	<i>Didelphis virginiana</i>	Virginia opossum
10.	<i>Microtus ochrogaster</i>	Prairie vole
11.	<i>Microtus pennsylvanicus</i>	Meadow vole
12.	<i>Mus musculus</i>	House mouse
13.	<i>Peromyscus leucopus</i>	White-footed mouse
14.	<i>Peromyscus maniculatus</i>	Deer mouse
15.	<i>Reithrodontomys humulis</i>	Eastern harvest mouse
16.	<i>Glaucomys volans</i>	Southern flying squirrel
17.	<i>Marmota monax</i>	Woodchuck
18.	<i>Sciurus niger</i>	Fox squirrel
19.	<i>Spermophilus tridecemlineatus</i>	Thirteen-lined ground squirrel
20.	<i>Tamias striatus</i>	Eastern chipmunk
21.	<i>Zapus hudsonius</i>	Meadow jumping mouse

A plant survey was completed in 1995 documenting 438 species for the park (Bennett and Course 1996).

<u>Scientific Name</u>	<u>Common Name</u>
<i>Abutilon theophrasti</i> Medikus	Velvet leaf
<i>Acalypha rhomboidea</i> Raf.	Three seeded mercury
<i>Acalypha virginica</i> L.	Virginia copperleaf
<i>Acer negundo</i> L. <i>negundo</i>	Box elder
<i>Acer rubrum</i> L.	Red maple
<i>Acer saccharinum</i> L.	Silver maple
<i>Acer saccharum</i> Marshall	Sugar maple
<i>Achillea millefolium</i> L.	Yarrow
<i>Actaea alba</i> (L.) Miller	Doll's eyes
<i>Adiantum pedatum</i> L.	Maidenhair fern
<i>Aesculus glabra</i> Willd.	Ohio buckeye
<i>Aesculus hippocastanum</i> L.	Horse chestnut

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<i>Agastache nepetoides</i> (L.) Kuntze	Yellow giant hyssop
<i>Agrimonia gryposepala</i> Wallr	Common agrimony
<i>Agrimonia --parviflora</i> Aiton	Small-flowered agrimony
<i>Agrostis hyemalis</i> (Walter) BSP.	Bent grass
<i>Ailanthus Altissima</i> (Miller) Swingle	Tree of heaven
<i>Albizia julibrissin</i> Durazz	Mimosa
<i>Alisma subcordatum</i> Raf.	Somols floribunda
<i>Alliaria petiolata</i> (Bieb.) Cavara & Grande	Garlic mustard
<i>Allium cernuum</i> Roth	Nodding wild onion
<i>Allium tricoccum</i> Aiton.	Wild leek
<i>Allium vineale</i> L.	Field garlic
<i>Amaranthus retroflexus</i> L.	Red root pigweed
<i>Amaranthus tuberculatus</i> (Moq.) Sauer.	Amaranth
<i>Ambrosia artemisiifolia</i> L.	Common ragweed
<i>Ambrosia trifida</i> L.	Giant ragweed
<i>Ampelamus albidus</i> (Nutt.) Britton	Sand vine
<i>Amphicarpaea bracteata</i> (L.) Fern.	Hog peanut
<i>Anaphalium obtmsifolium</i>	Pearly everlasting
<i>Andropogon gerardii</i> Vitman	Big blue stem
<i>Anemone virginiana</i> L.	Thimble weed
<i>Anemonella thalictroides</i> (L.) Spach.	Rue Anemone
<i>Aplectrum hyemale</i> (Muhl.) Torr	Adam and Eve
<i>Apocynum cannabinum</i> L.	Indian hemp
<i>Aquilegia canadensis</i> L.	Wild columbine
<i>Arabidopsis thaliana</i> (L.) Heynh.	Mouse-ear cress
<i>Arabis penstellata</i>	Rock cress
<i>Arctium minus</i> Schk.	Common burdock
<i>Arisaema atrorubens</i> (Ait.) Schott	Jack-in-the-pulpit
<i>Artemisia annua</i> L.	Sweet wormwood
<i>Artemisia vulgaris</i> L.	Common mugwort
<i>Asarum canadensis</i> L.	Wild ginger
<i>Asclepias incarnata</i> L.	Swamp milkweed
<i>Asclepias syriaca</i> L.	Common milkweed
<i>Asclepias tuberosa</i> L.	Butterfly weed
<i>Asimina triloba</i> (L.)Dunal.	Pawpaw
<i>Asplenium platyneuron</i> (L.) Oakes	Ebony Spleenwort
<i>Aster</i>	Aster
<i>Aster cordifolius</i> L.	Heart leaved aster
<i>Aster lanceolatus</i> Willd. <i>simples</i> (Willd.) A. G. Jones	Eastern lined aster
<i>Aster lateriflorus</i> (L.) Britton	Starved aster
<i>Aster novae-angliae</i> L.	New England aster
<i>Aster pilosus pilosus</i> Willd.	Heath aster
<i>Aster saggitifolius</i> Willd.	Arrow-leaved aster
<i>Aster shortii</i> Lindley	Short's aster
<i>Aster spp.</i>	Aster
<i>Barbarea vulgaris</i> R. Br.	Common water cress/Yellow rocket
<i>Berberis thunbergii</i> DC.	Japanese barberry
<i>Bertenoa incara</i>	Mustard
<i>Bidens bipinnata</i> L.	Spainsh needles
<i>Bidens cernua</i> L.	Nodding bur marigold

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<i>Bidens frondosa</i> L.	Beggar's tick
<i>Bidens vulgata</i> Greene	Tall begger's tick
<i>Blephelia hirsuta</i> (Purch.) Benth.	Hairy wood mint
<i>Boehmeria cylindrica</i> (L.) Swartz.	False nettle
<i>Botrychium dissectum</i> Spreng.	Lace frond grape fern
<i>Botrychium virginianum</i> (L.) Swartz	Rattlesnake fern
<i>Brassica nigra</i> L.	Black mustard
<i>Bromus commutatus</i> Schrader	Hairy brome
<i>Bromus inermis</i> Leysser	Grab grass
<i>Bromus tectorum</i> L.	Downy brome grass
<i>Broussonetia papyrifera</i> (L.) Vent.	Paper mulberry
<i>Cacalia atriplicifolia</i> L.	Pale indian plantain
<i>Calystegia sepium</i> (L.) R. Br.	Hedge bindweed
<i>Camassia scilloides</i>	Wild hyacinth
<i>Campanula americana</i> L.	Tall bellflower
<i>Campsis radicans</i> (L.) Seemann	Trumpet creeper
<i>Capsella bursa-pastoris</i> (L.) Medikus	Sheperd's purse
<i>Cardamine arenicola parviflora</i> var (Britt) O. E. Schulz	Small-flowered bittercress
<i>Cardamine douglasii</i> Britton	Spring cress
<i>Cardamine parviflora</i> (Britt) O. E. Schulz <i>arenicola</i>	Spring cress
<i>Carduus nutans</i>	Nodding thistle
<i>Carex albicans</i> Willd. <i>albicans</i>	Sedge
<i>Carex albursina</i> Sheldon	Sedge
<i>Carex amphibola</i> Steudel	Sedge
<i>Carex blanda</i> Dewey	Sedge
<i>Carex careyana</i> Torr.	Sedge
<i>Carex davisii</i> Schwein & Torr.	Sedge
<i>Carex festucacea</i> Schkuhr	Sedge
<i>Carex flaccosperma</i> Dewey	Sedge
<i>Carex gracillima</i> Schwein	Sedge
<i>Carex hirtifolia</i>	Sedge
<i>Carex jamesii</i> Schwein.	Sedge
<i>Carex laxiculmis</i> Schwein.	Sedge
<i>Carex retroflexa texensis</i>	Fernn sedge
<i>Carex rosea</i> Schk.	Sedge
<i>Carex shortiana</i> Dewey	Sedge
<i>Carex</i> spp.	Sedge
<i>Carex squarrosa</i>	Sedge
<i>Carex squarrosa</i> L.	Sedge
<i>Carex stipata</i>	Sedge
<i>Carex vulpinoidea</i> Michx.	Sedge
<i>Carpinus caroliniana</i> Walter	Ironwood
<i>Carya cordiformis</i> (Wangenh.) K. Koch.	Bitternut hickory
<i>Carya ovata</i> (Miller) K. Koch	Shagbark hickory
<i>Catalpa speciosa</i> Warder	Northern catalpa
<i>Celastrus scandens</i> L.	American bittersweet
<i>Celtis occidentalis</i> L.	Hackberry
<i>Cerastium vulgatum</i> L.	Mouse-eared chickweed
<i>Ceratophyllum</i> spp.	Coontail
<i>Cercis canadensis</i> L. <i>canadensis</i>	Redbud

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<i>Chaerophyllum procumbens</i> (L.) Crantz <i>shortii</i> T & G	Chervil
<i>Chasmanthium latifolium</i> (Michx.) Yates	Wild oats
<i>Chenopodium album</i> L.	Lambs quarter
<i>Chrysanthemum leucanthemum</i> L.	Ox-eye Daisy
<i>Cichorium intybus</i> L.	Chicory (Blue sailor)
<i>Cinna arundinacea</i> L.	Common wood reed
<i>Circaea lutetiana</i> L.	Enchanter's nightshade
<i>Cirsium arvense</i> (L.) Scop. <i>horridum</i> Wimmer	Canada thistle
<i>Cirsium vulgare</i> (Savi.) Tenore	Bull thistle
<i>Claytonia virginica</i> L.	Spring Beauty
<i>Clematis viorna</i> L.	Leather-flower
<i>Clematis virginiana</i> L.	Virgin's bower
<i>Commelina communis</i> L.	Asiatic dayflower
<i>Conium maculatum</i>	Poison hemlock
<i>Convolvulus arvensis</i>	Field bindweed
<i>Conyza canadensis canadensis</i> (L.) Cronq.	Horse weed
<i>Cornus drummondii</i> C. A. Meyer	Rough-leaved dogwood
<i>Cornus florida</i> L.	Flowering dogwood
<i>Corydalis flavula</i> (RAF.) DC.	Corydalis
<i>Crataegus coccinea</i> L.	Hawthorn
<i>Crataegus crus-galli</i> L.	Cockspur thorn
<i>Crataegus punctata</i> Jacq.	Dotted hawthorn
<i>Crataegus</i> spp.	Hawthorn
<i>Cryptotaenia canadensis</i> (L.) DC.	Honewort
<i>Cyperaceae</i> spp.	Sedge
<i>Cyperus esculentus</i> L.	Yellow nut-sedge
<i>Dactylis glomerata</i> L.	Orchard grass
<i>Datura stramonium</i> L.	Jimson weed
<i>Daucus carota</i> L.	Queen anne's lace
<i>Delphinium tricorne</i> Michx.	Dwarf larkspur
<i>Desmodium canescens</i> (L.) DC.	Hoary tick-terfoil (sticktight)
<i>Desmodium nudiflorum</i> (L.) DC.	Naked flower tick-terfoil
<i>Dianthus armeria</i>	Deptford pink
<i>Dicentra cucullaria</i> (L.) Bernh.	Dutchman's Breeches
<i>Digitaria sanguinalis</i> (L.) Scop.	Crabgrass
<i>Dipsacus sylvestris</i> Hudson	Teasel
<i>Draba verna</i> L.	Whitlow grass
<i>Duchesnia indica</i> (Andrews) Focke	Indian strawberry
<i>Echinacea purpurea</i> (L.) Moench.	Purple coneflower
<i>Echinochloa crusgalli</i> (L.) Beauv.	Barnyard grass
<i>Echium vulgare</i>	Small bugloss
<i>Elaeagnus angustifolia</i> L.	Russian olive
<i>Eleocharis ovata</i>	Blunt slake-rush
<i>Eleocharis ovata</i> (Roth) Roemer & Schultes	Blunt spike-rush
<i>Eleusine indica</i> (L.) Gaertn.	Goose grass
<i>Elymus canadense</i> L.	Canada wild rye
<i>Elymus hystrix</i> L.	Bottle brush grass
<i>Elymus villosus</i> Muhl.	Downy wild rye
<i>Elytrigia repens</i> (L.) Nevski	Quack grass
<i>Epilobium glandulosum</i> Lehm.	Northern willow-herb

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Equisetum arvense L.
Eragrostis capillaris (L.) Nees.
Erechtites hieracifolia hieracifolia (L.) Raf.
Erigenia bulbosa (Michx.) Nut.
Erigeron annuus (L.) Pers.
Erigeron philadelphicus L.
Erysimum repandum L.
Erythronium albidum Nutt.
Euonymus alatus (Thunb.) Siebold
Euonymus atropurpureus Jacq.
Eupatorium altissima L.
Eupatorium coelestinum L.
Eupatorium perfoliatum L.
Eupatorium purpureum L.
Eupatorium rugosum rugosum Houttuyn
Eupatorium serotinum Michx.
Euphorbia commutata Engelm.
Euphorbia dentata Michx.
Euphorbia maculata L.
Euthamia graminifolia (L.) Nutt.
Fagus grandifolia Ehrh.
Festuca elatior L.
Festuca ovina L.
Festuca spp.
Festuca subverticillata (Pers.) E. Alexeev.
Fragaria virginiana Duchesne
Fraxinus americana americana L.
Fraxinus excelsior L.
Fraxinus pennsylvanica Marshall subintegerrima
(Vahfern)
Fraxinus pennsylvanica pennsylvanica Marshall.
Fraxinus quadrangulata Michx.
Galium aparine L.
Galium circaezans
Galium concinnum
Galium mollugo L.
Gaura biennis L.
Gaura biennis L.
Geranium carolinianum L.
Geranium maculatum L.
Geum canadense Jacq.
Geum vernum (Raf.) T & G
Glechoma hederacea L.
Gleditsia triacanthos L.
Glyceria striata
Gymnocladus dioica (L.) K. Koch
Hackelia virginiana (L.) I.M. Johnston
Hamamelis virginiana L.
Hedeoma pulegioides (L.) Pers.
Helianthus tuberosus L.

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Horsetail
Lace grass
Pilewort or Fireweed
Harbinger-of-spring
Daisy fleabane
Philadelphia fleabane
Treacle mustard
White Adder's Tongue
Winged burning bush
Wahoo
Tall thoroughwort
Mistflower
Boneset
Trumpet weed
White snakeroot
Late flowering boneset
Wood sparge
Toothed spurge
Spotted spurge
Flat-topped goldenrod
Beech
Tall fescue
Sheep fescue
Fescue
Nodding Fescue
Wild Strawberry
White ash
European ash

Green ash
Red ash
Blue ash
Cleavers
Wild licorice
Shining bedstraw
White bedstraw
Biennial gaura
Small flowered gaure
Carolina Cranesbill
Cranesbill
White avens
Spring avens
Gill-over-the-ground
Honey locust
Foul mannagrass
Kentucky coffee tree
Begger's lice
Witch hazel
American pennyroyal
Jerusalem artichoke

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Heliopsis helianthoides (L.) Sweet
Heliopsis helianthoides (L.) Sweet *scabra* (Dunal) Fer
Hemerocallis fulva (L.) L.
Hesperis matronalis L.
Hibiscus syriacus L.
Hibiscus trionum L.
Hieracium caespitosum Dumort
Humulus lupulus L. *pubescens* E. Small
Hydrastis canadensis L.
Hydrophyllum appendiculatum Michx.
Hypericum mutilum L.
Hypericum perforatum L.
Hypericum punctatum Lam.
Impatiens capensis Meerb
Impatiens pallida Nutt.
Iodanthus Pinnatifidus (Michx.) Stued.
Ipomoea hederacea Jacq.
Ipomoea lacunosa L.
Ipomoea pandurata (L.) G. Meyer
Jeffersonia diphylla (L.) Pers.
Juglans nigra L.
Juncus tenuis Willd.
Juncus torreyi Cov.
Juniperus virginiana
Juniperus virginiana L.
Justicia americana (L.) M. Vahl
Koelreuteria paniculata Laxm.
Kuhnia eupatorioides L.
Lactuca canadensis L.
Lactuca floridana L.
Lactuca serriola L.
Lamium album L.
Lamium amplexicaule L.
Lamium purpureum L.
Laportea canadensis (L.) Wedd.
Leersia virginica Willd.
Leonurus cardiaca L.
Lepidium campestre (L.) R. BR.
Lepidium virginicum L.
Ligustrum vulgare L.
Lilium canadense L.
Liriodendron tulipifera L.
Lithospermum arvense L.
Lobelia inflata L.
Lobelia siphilitica L.
Lonicera japonica Thumb.
Lonicera maackii (Rupr.) Maxim.
Lonicera tartarica L.
Luzula multiflora (Retz.) Lej
Lycopus americanus Muhl.

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False sunflower
False sunflower
Day lily
Dame's rocket
Rose of Sharon
Flower of the hour
Yellow hawkweed
Common hops
Golden seal
Appendaged waterleaf
Small-flowered St. John's-wort
Common St. John's wort
Spotted St. John's wort
Orange jewelweed
Pale touch-me-not
Purple rocket
Ivy-leaved morning-glory
Small white morning glory
Wild potato vine (morning glory)
Twinleaf
Black walnut
Path rush
Rush
Red cedar
Eastern red cedar
American water willow
Golden raintree
False boneset
Wild lettuce
Tall blue lettuce
Prickly lettuce
White dead nettle
Purple henbit
Purple dead nettle
Wood nettle
White grass
Motherwort
Field peppergrass
Pepper grass
Privet
Canada lily
Tuliptree
Corn Gromwell
Indian tobacco
Great lobelia
Japanese honeysuckle
Honeysuckle
Tartarian honeysuckle
Wood rush
Water horehound

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Lysimachia ciliata L.
Lysimachia nummularia L.
Maclura pomifera (Raf.) Schneid.
Malva rotundifolia L.
Matricaria maritima L.
Matricaria matricarioides (Less.) Porter
Medicago lupulina L.
Medicago sativa L.
Melilotus alba
Melilotus officinalis (L.) Pallas
Menispermum canadense L.
Mertensia virginica (L.) Pers.
Mimulus alatus Aiton.
Mirabilis nyctaginea (Michx.) MacMillan
Monarda fistulosa L.
Morus alba L.
Morus rubra L.
Muhlenbergia schreberi J. F. Gmelin
Nepeta cataria L.
Oenothera biennis L.
Oenothera perennis L.
Onoclea sensibilis L.
Ornithogalum umbellatum L.
Osmorhiza claytoni (Michx.) C. B. Clarke
Osmorhiza longistylis (Torr.) DC
Ostrya virginiana (Miller) K. Koch
Oxalis stricta L.
Oxalis violacea L.
Panax quinquefolium L.
Panicum capillare L.
Panicum dichotomiflorum Michx.
Panicum lanuginosum
Panicum lanuginosum Elliot
Panicum latifolium L.
Panicum virgatum L.
Papaver dubium L.
Parthenocissus quinquefolia (L.) Planchon
Pastinaca sativa L.
Penstemon digitalis
Penstemon digitalis Nutt.
Penstemon hirsutus (L.) Willd.
Penthorum sedoides L.
Petunia hybrida Vilm.
Phacelia purshii Buckley
Philadelphus inodorus L.
Philadelphus pubescens Loisel
Phleum pratense
Phlox divaricata L.
Phlox paniculata
Phryma leptostachya L.

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Fringed lousestrife
Moneywort
Osage orange
Cheeses
Scentless chamomile
Pineapple weed
Black Medick
Alfalfa
White sweet clover
Yellow Sweet clover
Moonseed
Virginia bluebell
Winged monkey flower
Hearted-leaved umbrella wort
Wild bergamot
White mulberry
Red mulberry
Nimblewill
Catnip
Evening primrose
Small sundrops
Sensitive fern
Star of Bethlehem
Hairy sweet cicely
Smooth sweet cicely
Hop hornbeam
Common yellow oxalis
Violet wood sorrel
American ginseng
Witch grass
Wiry witch grass
Panic grass
Hairy panic grass
grass
Switch grass
Poppy
Virginia creeper
Wild parsnip
Foxglove beardtongue
Fox glove beard tongue
Hairy beard tongue
Ditch stoncrop
Garden petunia
Miami Mist
Appalachian mock orange
Ozark mock orange
Timothy grass
Wild blue phlox
Garden phlox
Lopseed

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Physalis heterophylla Nees.
Physalis longifolia Nutt. *subglabrata* (Mackenzie & Bus.)
Physocarpus opulifolius (L.) Maxim.
Phytolacca americana L.
Pilea pumila (L.) A. Gray
Pinus nigra Arnold
Pinus resinosa
Pinus strobus L.
Plantago lanceolata L.
Plantago major L.
Plantanus occidentalis
Poa pratensis L.
Poa sylvestris A. Gray
Podophyllum peltatum L.
Polemonium reptans L.
Polygonatum biflorum (Walter) Elliott
Polygonum aviculare L.
Polygonum cespitosum Blume *longisetum* (De Bruyn) Stewart
Polygonum pennsylvanicum L.
Polygonum persicaria L.
Polygonum punctatum Elliot.
Polygonum scandens L. *dumetorum* (L.) Gleason
Polygonum virginianum L.
Polymnia canadensis L.
Polystichum acrostichoides (Michx.) Schott.
Populus deltoides Marshall
Potamogeton nodosus Poir.
Potentilla norvegica L.
Potentilla recta L.
Prunella vulgaris L. *lanceolata* (Barton) Fern.
Prunus mahaleb L.
Prunus serotina Ehrh.
Ptelea trifoliata L.
Pyrus malus L.
Quercus alba L.
Quercus bicolor Willd.
Quercus coccinea Muenchh.
Quercus imbricaria Michx.
Quercus macrocarpa Michx.
Quercus muehlenbergii Engelm
Quercus palustris Muenchh.
Quercus rubra L.
Ranunculus abortivus L.
Ranunculus hispidus Michx.
Ranunculus micranthus Nutt.
Ratibida pinnata (Vent.) Barnhart
Rhodotypos scandens (Thunb.) Makino
Rhus glabra L.

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Clammy ground cherry
Long leaf ground cherry
Nine bark
Pokeweed
Clear weed
Austrian pine
Red pine
White pine
Buck plantain
Common plantain
Sycamore
Kentucky bluegrass
Wood bluegrass
May-apple
Greek Valerian
Soloman's Seal
Doorweed
Smartweed
Pennsylvania smartweed
Lady's thumb
Dotted smartweed
False buckwheat
Jumpseed
Small flowered leafcup
Christmas fern
Cottonwood
Long-leaved pondweed
Rough cinquefoil
Upright cinquefoil
Selfheal
Cherry
Black cherry
Hop tree
Apple
White oak
Swamp white oak
Scarlet oak
Shingle oak
Bur oak
Chinquapin oak
Pin oak
Red oak
Small-leaved buttercup
Hispid buttercup
Buttercup
Green-headed cone flower
Rhodotypos
Smooth sumac

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Rhus typhina L.
Robinia pseudoacacia L.
Rorippa nasturtium-aquaticum (L.) Hayek
Rosa multiflora Thunb.
Rosa setigera Michx.
Rubus allegheniensis T. C. Porter
Rubus occidentalis L.
Rubus occidentalis L.
Rubus pensilvanicus Poiret.
Rudbeckia fulgida Aiton
Rudbeckia hirta L. var. *pulcherrima* Farw.
Rudbeckia triloba L.
Ruellia strepens L.
Rumex acetosella L.
Rumex crispus L.
Rumex obtusifolius L.
Rumex verticillatus L.
Sagittaria latifolia latifolia Willd
Salix nigra Marsh.
Sambucus canadensis L.
Sanguinaria canadensis L.
Sanicula gregaria E. Bickn.
Saponaria officinalis L.
Sassafras albidum (Nutt.) nees.
Scirpus atrovirens Willd.
Scirpus lineatus Michx.
Scrophlaria marilandica Pursh.
Senecio abovatus Muhl.
Senecio aureus L.
Senecio obovatus Muhl.
Setaria faberi R. Herrm.
Setaria glauca (L.) P. Beauv
Setaria italica (L.) P. Beauv.
Setaria viridis (L.) P Beauv.
Seymeria macrophylla (Nutt.) Raf.
Sicyos angulatus L.
Sida spinosa L.
Silene antirrhina L.
Silene latifolia Poiret
Silene noctiflora L.
Silene stellata (L.) Aiton.f.
Silene virginiana
Silene vulgaris
Silphium perfoliatum L.
Sisymbrium officinale (L.) Scop.
Sisyrinchium angustifolium Miller
Smilacina racemosa (L.) Desf.
Smilax ecirrhata (Engelm.) S. Wats
Smilax rotundifolia L.
Solanum carolinense L.

Staghorn sumac
Black locust
Water cress
Multiflora rose
Prairie rose
Common blackberry
Black raspberry
Blackberry
Pennsylvania blackberry
Orange coneflower
Black-eyed susan
Three-lobed sunflower
Smooth ruellia
Sheep sorrel
Curled dock
Bitter dock
Water dock
Common arrowhead
Black willow
Common elderberry
Bloodroot
Clustered snakeroot
Bouncing bet
Sassafras
Black bulrush
Bulrush
Maryland figwort
Squawweed
Golden ragwort
Squawweed
Giant foxtail
Yellow foxtail
Foxtail
Green foxtail
Mullein foxglove
Bur cucumber
Prickly mallow
Sleepy catchfly
White campion
Night flowering catchfly
Starry campion
Fire pink
Bladder campion
Cup-plant
Hedge mustard
Blue-eyed grass
False solomon's seal
Catbrier
Greenbrier or Sawbrier
Horse nettle

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<i>Solanum nigrum virginicum</i> L.	Black nightshade
<i>Solidago canadensis</i> L.	Common goldenrod
<i>Solidago flexicaulis</i> L.	Zig Zag goldenrod
<i>Solidago gigantea</i> Aiton.	Late goldenrod
<i>Solidago gigantea</i> Aiton. <i>leiophylla</i> Fern.	Late goldenrod
<i>Solidago juncea</i> Aiton	Early golden (yellow-top)
<i>Solidago rugosa</i> Miller	Rough goldenrod
<i>Solidago</i> spp.	Golden rod
<i>Sonchus asper</i> (L.) Hill	Spiny-leaved sow thistle
<i>Sonchus asper</i> (L.) Hill	Prickly sow thistle
<i>Sorghastrum nutans</i> (L.) Nash	Indian grass
<i>Sorghum halepense</i> (L.) pers	Johnson grass
<i>Spiranthes ovalis</i> Lindl. <i>erostellata</i> Catling	Lesser ladies tresses
<i>Stellaria media</i> (L.) Villars	Chickweed
<i>Stellaria media</i> (L.) Villars	Common chickweed
<i>Symphoricarpos orbiculatus</i> Moench	Indian currant (coralberry)
<i>Syringa vulgaris</i> L.	Lilac
<i>Taraxacum officinale</i> Weber	Dandelion
<i>Teucrium canadense</i> L.	Wild germander
<i>Thalictrum revolutum</i> DC.	Wasy meadow rue
<i>Thlaspi arvense</i> L.	Field pennycress
<i>Thlaspi perfoliatum</i> L.	Perfoliate pennycress
<i>Thuja occidentalis</i>	Northern white cedar
<i>Tilia americana</i> L.	Basswood
<i>Torilens arvensis</i> (Hudson) Link.	Hemlock parsley
<i>Tragopogon pratensis</i> L.	Yellow goat's beard
<i>Tridens flavus</i> (L.) A. Hitchc.	Purple top
<i>Trifolium campestre</i> Schreb.	Low hop clover
<i>Trifolium hybridum</i> L.	Alsike clover
<i>Trifolium incarnatum</i> L.	Crimson clover
<i>Trifolium pratense</i> L.	Red clover
<i>Trillium sessile</i> L.	Sessile trillium
<i>Triodanis perfoliata</i> (L.) Nieuwl	Venus looking glass
<i>Triticum aestivum</i> L.	Common wheat
<i>Typha latifolia</i> L.	Wide-leaved cattail
<i>Ulmus americana</i> L.	American elm
<i>Ulmus pumila</i> L.	Chinese elm
<i>Ulmus rubra</i> Muhl.	Slippery elm
<i>Urtica dioica</i> L. <i>procera</i> (Muhl.) Wedd.	Tall nettle
<i>Urtica dioica</i> L. var. <i>procera</i> (Muhl.) Wedd.	Tall nettle
<i>Utricularia gibba</i> L.	Humped bladderwort
<i>Uvularia grandiflora</i> J. E. Smith	Large-flowered bellwort
<i>Valerianella chenopodifolia</i> (Purch.) DC.	Great Lakes corn salad
<i>Valerianella locusta</i> (L.) Betcke.	Blue corn-salad
<i>Verbascum blatteria</i> L.	Moth mullein
<i>Verbascum thapsus</i> L.	Giant mullein
<i>Verbena hastata</i> L.	Blue vervain
<i>Verbena urticifolia</i> L.	White vervain
<i>Verbesina alternifolia</i> (L.) Britton	Wing stem
<i>Vernonia gigantea gigantea</i> (Walter) Trel.	Tall ironweed

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Veronica arvensis L.
Veronica officinalis
Veronica persica Poir
Veronica serpyllifolia L.
Viburnum opulus L.
Vicia cracca L.
Vinca minor L.
Viola palmata L.
Viola pubescens Aiton
Viola rafinesquii Greene
Viola sororia Willd.
Viola striata
Viola stricta Aiton
Vitis aestivalis aestivalis Michx.
Vitis riparia Michx.
Vitis vulpina L.
Xanthium strumarium L.

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Corn speedwell
Common speedwell
Persian speedwell
Thyme-leaved speedwell
High bush cranberry
Cow vetch
Periwinkle
Early violet
Smooth yellow violet
Field pansy
Dooryard violet
Striped violet
Striped violet
Summer grape
River grape
Fox grape
Clotbur

D. Documents (NEPA and NHPA)

Will be inserted here.

E. Supplemental Information

1. Interagency Fire Agreements

At this time there are no written agreements with cooperating agencies.

2. Fire Call-Up List

Name	Qualifications	Telephone
Myra Vick	FFT2 FireFighter	740 774-1126
Josh Stevens	FFT2 FireFighter	740 774-1126
Rick Perkins	FFT2 FireFighter	740 774-1126

3. Preparedness Inventory

Fire Equipment	Number	Comments
Fire Shelter w/case no plastic L.	9	
Fire Shelter w/case	3	
Fire shelter, training	5	
Fire Pack, personal Gear	3	
Pack, fireline w/gear	2	
Sleeping Bag	1	
Helmet, Yellow	3	
Goggles/Safety Glasses	2	
Headlamp	2	
Leather Gloves	12	
Nomex fire Pants	14	
Nomex Fire Shirts	14	
Nomex Jacket	1	
Canteen, 1 qt	35	
Canteen, 2 qt	9	
Equipment belt	7	
Bastard File	12	
File Handles	11	
Ear plugs	Numerous	
Pocket knives	2	
Compass	1	
Tent fly	1	
Pulaski	5	
Backpack Pump	3	
1 ½ fire hose	150'	

4. Agency and Interagency Contacts

a. Agency

Hopewell Culture National Historical Park
16062 State Route 104
Chillicothe, OH 45601-8694
740-774-1125

Name	Work Phone
Superintendent Dean Alexander	740-774-1126
Archeologist Jennifer Pederson	740-774-1126
Biologist Myra Vick	740-774-1126
Regional Fuels Management Specialist Scott Beacham	402-661-1768
Regional Fire Ecologist Jim DeCoster	402-661-1758
Regional Fire Management Officer Vacant	402-661-1754
Regional Wildland Fire Management Specialist Jim Mattingly	402-661-1762

b. Cooperating Agencies

Organization	Phone	Address
Ohio Interagency Dispatch Center	740-753-0546 740-373-9055	13700 US Highway 83 Nelsonville, OH 45764
Mike Bowden Ohio Department of Natural Resources Division of Forestry	614-265-1088	2045 Morse Road, H1 Columbus, OH 43229
National Weather Service Weather Forecast Office Wilmington, Ohio	937-383-0031	1901 S. State Route 134 Wilmington, OH 45177
Steve Alspach Ohio Department of Air Pollution Control Ross County, Ohio	740-380-5424	2195 Front Street Logan, OH 43138
Liberty Township VFD	740-887-4774	34568 US Highway 50 Chillicothe, OH 45601
Springfield Township VFD	740-775-9900	60 Firehouse Drive Chillicothe, OH 45601
Twin Township VFD	740-626-2686	11521 US Highway 50 Bourneville, OH 45617
Union Township VFD	740-775-8004	12034 Pleasant Valley Road Chillicothe, OH 45601

F. Wildland and Prescribed Fire Monitoring

This plan will be inserted upon completion.

G. Pre-Attack Plan

No pre-attack plan has been written due to the low occurrence and small size of wildland fires and the initial attack responsibility of the different cooperating agencies.

H. Hazard Fuel Reduction Plan

Park will insert if projects are needed.

I. Fire Prevention Plan

No prevention plan has been written due to the low occurrence and small size of wildland fires.

J. Rental Equipment Agreements

No rental equipment agreements exist at this time.

K. Contracts for Suppression and Prescribed Fire Resources

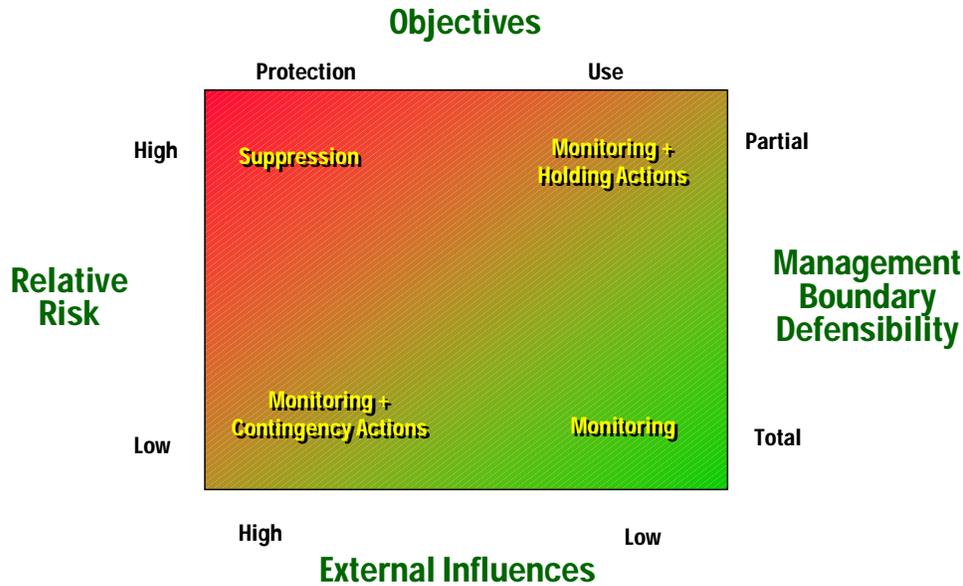
No contracts for suppression or prescribed fire resources exist at this time.

L. Burned Area Emergency Stabilization and Rehabilitation Plan

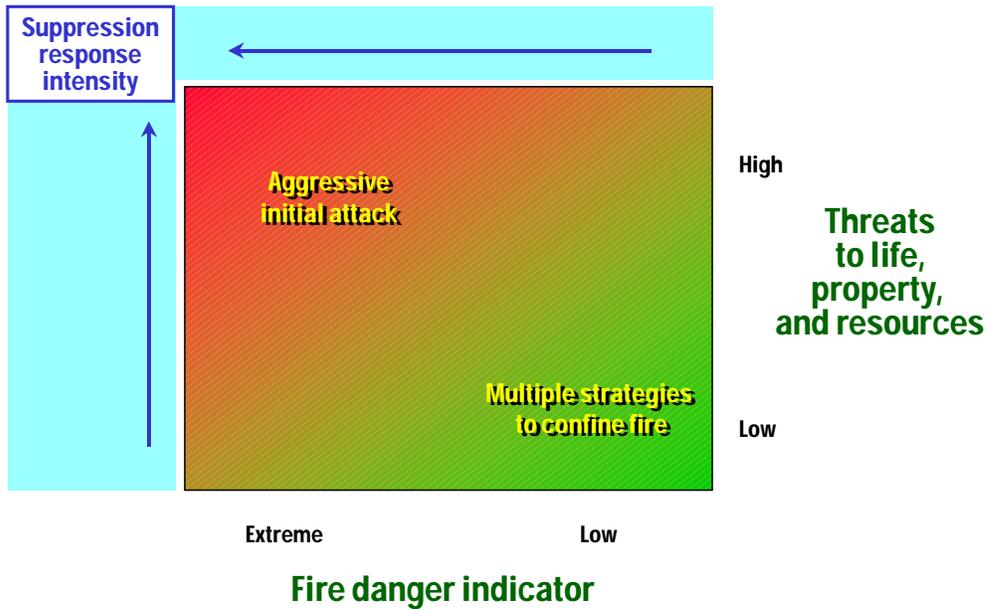
No burned area emergency stabilization and rehabilitation plan has been written due to the low occurrence and small size of wildland fires.

M. Charts for Determining Appropriate Management Response

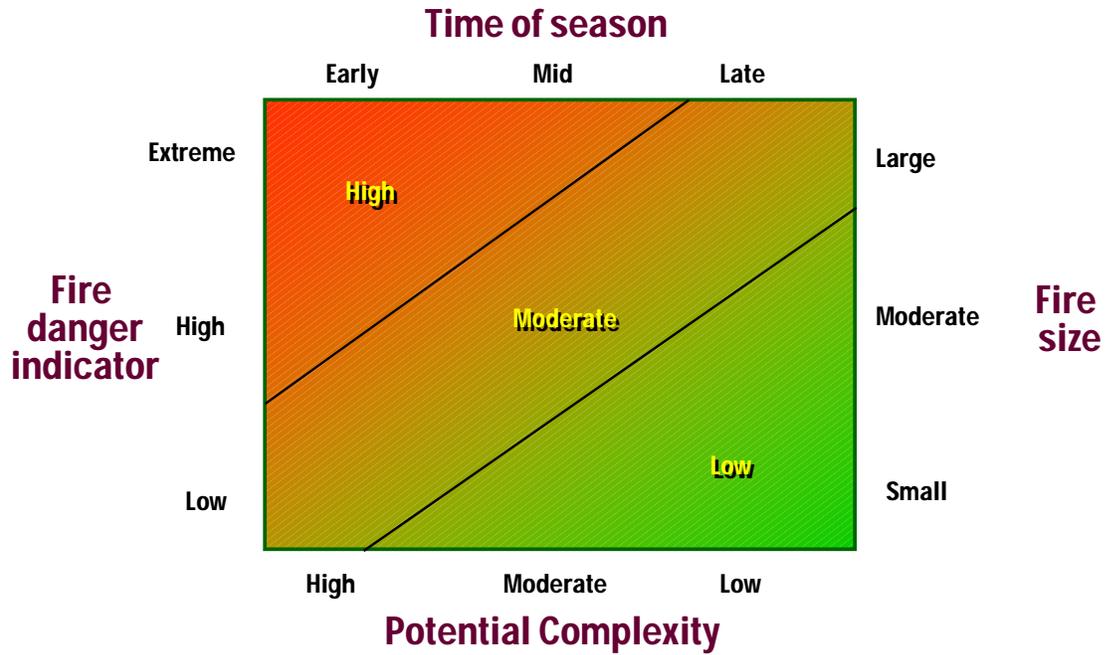
Appropriate Management Response



Appropriate Management Response



Wildland Fire Relative Risk Rating



Zimmerman, G. & Bunnell, D.1998. *Wildland and Prescribed Management Policy – Implementation Procedures Reference Guide* http://www.fs.fed.us/fire/fireuse/wildland_fire_use/ref_guide/refguide.doc

N. Wildland Fire Situation Analysis (WFSA)

Section I, WFSA Information Page

(This page is completed by the Agency Administrator(s).)

A. Jurisdiction(s): *Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.*

B. Geographic Area: *Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.*

C. Unit(s): *Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.*

D. WFSA #: *Identify the number assigned to the most recent WFSA for this fire.*

E. Fire Name: *Self-explanatory.*

F. Incident #: *Identify the incident number assigned to the fire.*

G. Accounting Code: *Insert the local unit's accounting code.*

H. Date/Time Prepared: *Self-explanatory.*

I. Attachments: *Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.*

I. Wildland Fire Situation Analysis	
<i>To be completed by the Agency Administrator(s)</i>	
A. Jurisdiction(s)	B. Geographic Area
C. Unit(s)	D. WFSA #
E. Fire Name	F. Incident #
G. Accounting Code:	
H. Date/Time Prepared _____ @ _____	
I. Attachments	
<ul style="list-style-type: none"> - Complexity Matrix/Analysis * - Risk Assessment/Analysis * <ul style="list-style-type: none"> Probability of Success * Consequences of Failure * - Maps * - Decision Tree ** - Fire Behavior Projections * - Calculations of Resource Requirements * - Other (specify) <p>*Required</p> <p>**Required by FWS</p>	

Section II. Objectives and Constraints

(This page is completed by the Agency Administrator(s).)

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit's Resource Management Plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints
<i>To be Completed by the Agency Administrator(s)</i>
A. Objectives (Must be specific and measurable) 1. Safety - Public - Firefighter 2. Economic 3. Environmental 4. Social 5. Other B. Constraints

Section III. Alternatives

(This page is completed by the Fire Manager and/or Incident Commander.)

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet Resource Management Plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment: Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. Map: A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives <i>(To be completed by FMO / IC)</i>			
	A	B	C
A. Wildland Fire Strategy			
B. Narrative			
C. Resources Needed			
Handcrews			
Engines			
Dozers			
Airtankers			
Helicopters			
Other			
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment			
- Probability of Success			
- Consequence Of failure			
H. Complexity			
I. Attach maps for each alternative			

Section IV. Evaluation of Alternatives

(This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.)

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. (Those listed are defaults only – not all will be applicable to every fire – add or delete as appropriate for each incident.) Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the Resource Management Plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives			
<i>To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander</i>			
A. Evaluation Process	A	B	C
<i>Safety</i>			
Firefighter			
Aviation			
Public			
<i>Sum of Safety Values</i>			
<i>Economic</i>			
Forage			
Improvements			
Recreation			
Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
<i>Sum of Economic Values</i>			
<i>Environmental</i>			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
<i>Sum of Environmental Values</i>			
<i>Social</i>			
Employment			
Public Concern			
Cultural			
Other (Specify)			
<i>Sum of Social Values</i>			
<i>Other</i>			

Section V. Analysis Summary

(This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.)

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) signature is mandatory.

V. Analysis Summary			
<i>To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander</i>			
Alternatives	A	B	C
A. Compliance with Objectives			
Safety			
Economic			
Environmental			
Social			
Other			
B. Pertinent Data			
Final Fire Size			
Complexity			
Suppression Cost			
Resource Values			
Probability of Success			
Consequences of Failure			
C. External / Internal Influences			
National & Geographic Preparedness Level _____			
Incident Priority _____			
Resource Availability _____			
Weather Forecast (long-range) _____			
Fire Behavior Projections _____			

National & Geographic Preparedness Level _____	
Incident Priority _____	
Resource Availability _____	
Weather Forecast (long-range) _____	
Fire Behavior Projections _____	
VI. Decision	
The Selected Alternative is: _____	
Rationale:	
_____	_____
Agency Administrator's Signature	Date/Time

Section VII. Daily Review

(This Section is completed by the Agency Administrator(s) or designate.)

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

(This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."
2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.
4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF WFSA TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rockslide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted	Yes/No	
1. Burning Index (from on-site measurement of weather conditions predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___
2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.).	___	___
3. Crowning, profuse or long-range spotting.	___	___
4. Weather forecast indicating no significant relief or worsening conditions.	___	___
Total:	___	___

B. RESOURCES COMMITTED

1. 200 or more personnel assigned.	___	___
2. Three or more divisions.	___	___
3. Wide variety of special support personnel.	___	___
4. Substantial air operation which is not properly staffed.	___	___
5. Majority of initial attack resources committed.	___	___
Total	___	___

C. RESOURCES THREATENED

1. Urban interface.	___	___
2. Developments and facilities.	___	___

3. Restricted, threatened or endangered species habitat.	___	___
4. Cultural sites.	___	___
5. Unique natural resources, special designation zones or wilderness.	___	___
6. Other special resources.	___	___
Total	___	___

D. SAFETY

1. Unusually hazardous fire line conditions.	___	___
2. Serious accidents or facilities.	___	___
3. Threat to safety of visitors from fire and related operations.	___	___
4. Restricted and/or closures in effect or being considered.	___	___
5. No night operations in place for safety reasons.	___	___
Total	___	___

E. OWNERSHIP

1. Fire burning or threatening more than one jurisdiction.	___	___
2. Potential for claims (damages).	___	___
3. Conflicting management objectives.	___	___
4. Disputes over fire management responsibility.	___	___
5. Potential for unified command.	___	___
Total	___	___

F. EXTERNAL INFLUENCES

1. Controversial wildland fire management policy.	___	___
2. Pre-existing controversies/relationships.	___	___
3. Sensitive media relationships.	___	___
4. Smoke management problems.	___	___

- | | | |
|-----------------------------------|-----|-----|
| 5. Sensitive political interests. | ___ | ___ |
| 6. Other external influences. | ___ | ___ |
| Total | ___ | ___ |

G. CHANGE IN STRATEGY

- | | | |
|--|-----|-----|
| 1. Change in strategy to control from confine or contain. | ___ | ___ |
| 2. Large amount of unburned fuel within planned perimeter. | ___ | ___ |
| 3. WFSA invalid or requires updating. | ___ | ___ |
| Total | ___ | ___ |

H. EXISTING OVERHEAD

- | | | |
|---|-----|-----|
| 1. Worked two operational periods without achieving initial objectives. | ___ | ___ |
| 2. Existing management organization ineffective. | ___ | ___ |
| 3. IMT overextended themselves mentally and/or physically. | ___ | ___ |
| 4. Incident action plans, briefings, etc., missing or poorly prepared. | ___ | ___ |
| Total | ___ | ___ |

Signature_____

Date_____ Time_____

O. Limited Delegation of Authority

LIMITED DELEGATION OF AUTHORITY

To: _____, Incident Commander

From: Superintendent, Hopewell Culture National Historical Park

Subject: Limited Delegation of Authority

As of _____ hours, on this date _____, I have delegated limited authority to manage the _____ fire in the Hopewell Culture National Historical Park.

As superintendent I have ultimate responsibility for protection of the Hopewell Culture National Historical Park's resources and the lives of the visitors and employees. Your expertise in the area of wildland fire incident management will assist me in fulfilling that responsibility during the present situation. My considerations for management of this fire are:

1. Provide for firefighter, visitor, resident and neighbor safety.
2. I would like the fire managed using the most appropriate strategy that foremost considers, safety, economic cost, and probability of success and consequences of failure. The selected strategy should be implemented using minimum impact management tactics.
3. Key cultural features requiring priority protection are:

4. Key resource considerations are:

5. Restrictions for suppression actions are: no tracked or wheeled vehicles in the following areas:

except when human life is at immediate risk. Helicopters, powersaws, portable pumps, and leaf blowers may be used as required. Chemical retardant is authorized as stipulated in the park fire management plan.

6. My agency advisor/representative will be: _____
7. Manage the fire cost effectively for the values at risk.
8. Provide training opportunities for park and local firefighters to the extent possible.
9. Minimize disruption of visitor access to park consistent with public safety.

Superintendent, Hopewell Culture National Historical Park

Date

P. Minimum Impact Suppression Tactics Guidelines

General Discussion

Suppression tactics will have an impact on the landscape. Following the minimum impact suppression tactics (MIST) guidelines outlined below can reduce the degree of long-term impacts associated with wildland fire suppression tactics. It is important that decision makers are aware of the long-term impacts fire suppression tactics can have on the landscape, and very carefully weigh those long-term impacts to fire suppression safety issues related to wildland fire incidents. The following are MIST standards that will be used in the park and provided to the Volunteer Fire Departments.

Also refer to RM-18, Chapter 9, Exhibit 5.

Tactical Standards

- Taking advantage of natural barriers, rock outcrops, trails, roads, and streams will minimize fireline construction, and other existing fuel breaks.
- Firelines will be the minimum width necessary to halt the spread of the fire, and will be placed to avoid impacts to natural and cultural resources vulnerable to the effects of fire and fire suppression activities.
- Limbing along the fireline will be done only as essential for the suppression effort and for safety.
- Unburned material may be left within the final line.
- Clearing and scraping will be minimized.
- Snags or trees will be felled only when essential for control of the fire or for safety of personnel.
- Where possible, on site archeological clearance will be obtained prior to line construction.

Terminating the Fire

- The route to the fire from the nearest trail or road will be flagged. The last person to leave the area will remove flagging.
- All equipment and debris will be removed from the area for proper disposal.
- Before leaving the fire, rehabilitation will be completed to eliminate impacts from the suppression effort.

Restoration of Fire Area

- Backfill cup trenches and scarify wide firelines.
- Construct waterbars to prevent erosion.
- Place “boneyards” in a natural or random arrangement.
- Position cut ends of logs so as to be inconspicuous to visitors and camouflage where possible.
- Flush cut stumps, camouflage with soil and moss.

Aircraft

Helicopters

- Minimize use.
- Restore helispots.

Retardant Aircraft

- Retardant drops require Superintendent’s approval.
- Use water drops where practical.
- Minimize number of drops to what is essential for control of the fire.

Q. Step-Up Staffing Plan

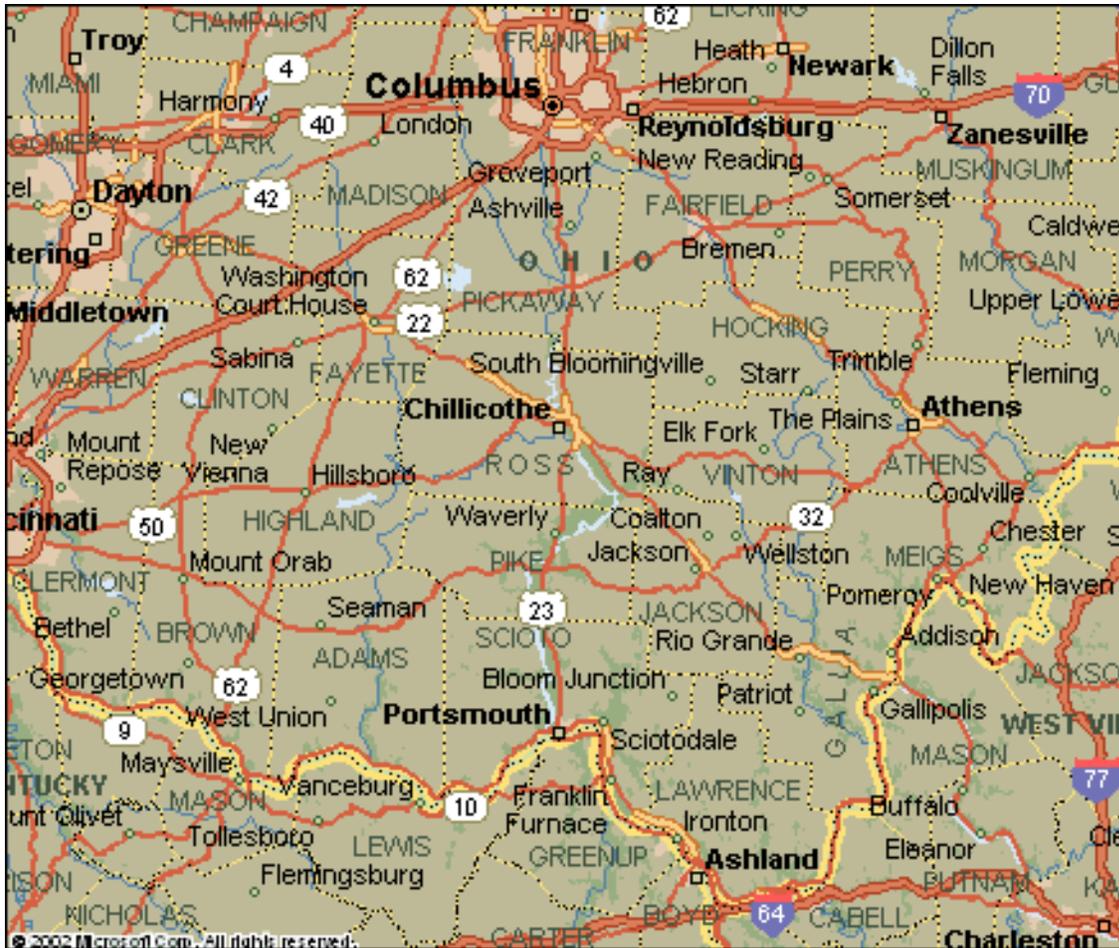
The park does not have a step-up plan as the volunteer fire departments and Ohio Department of Natural Resources, who are responsible for initial attack on parklands, use their own agency criteria and thresholds to determine their response under different conditions. Until the weather station at Chillicothe has recorded additional data, it isn't possible to establish adjective class ratings and thresholds for preparedness levels.

R. Historic Fuels Treatment Map

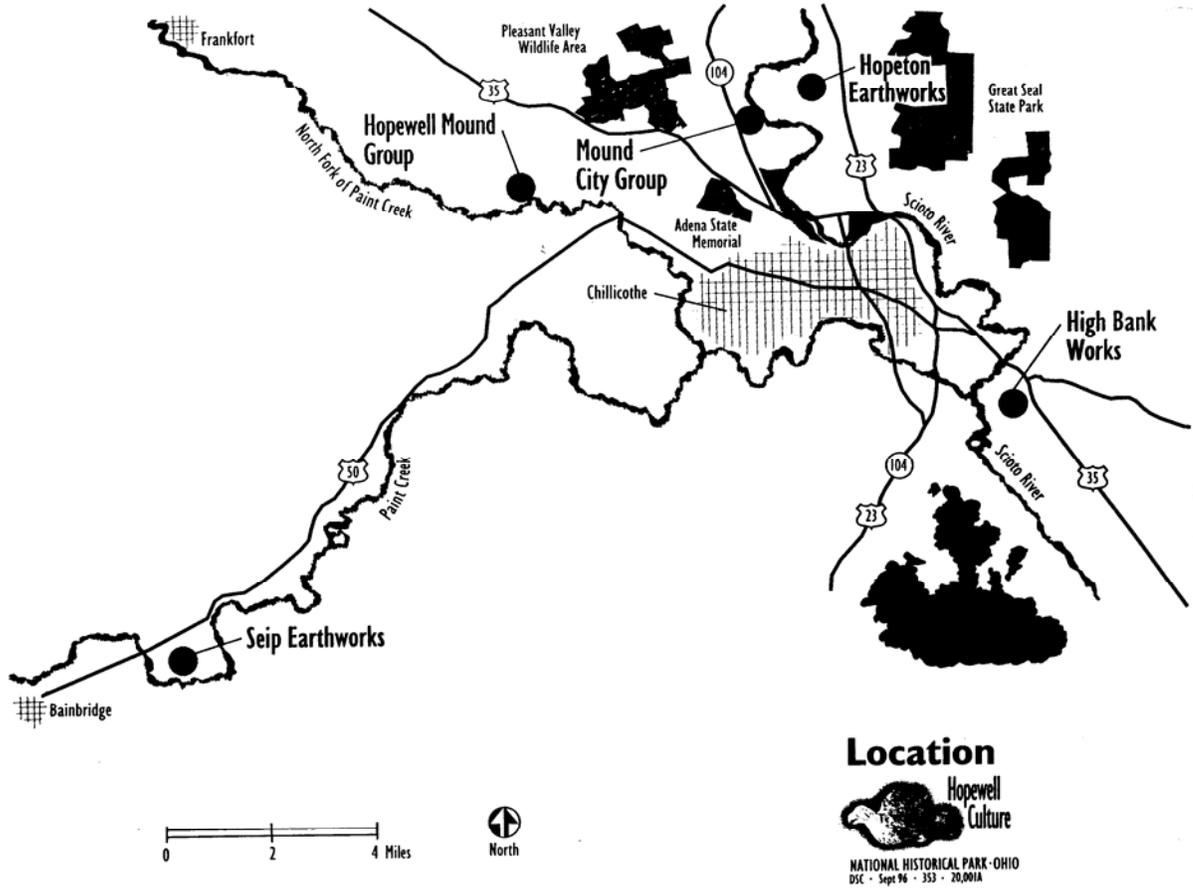
Projects will be entered as they are completed.

S. Area, Fire Unit, and Site Maps

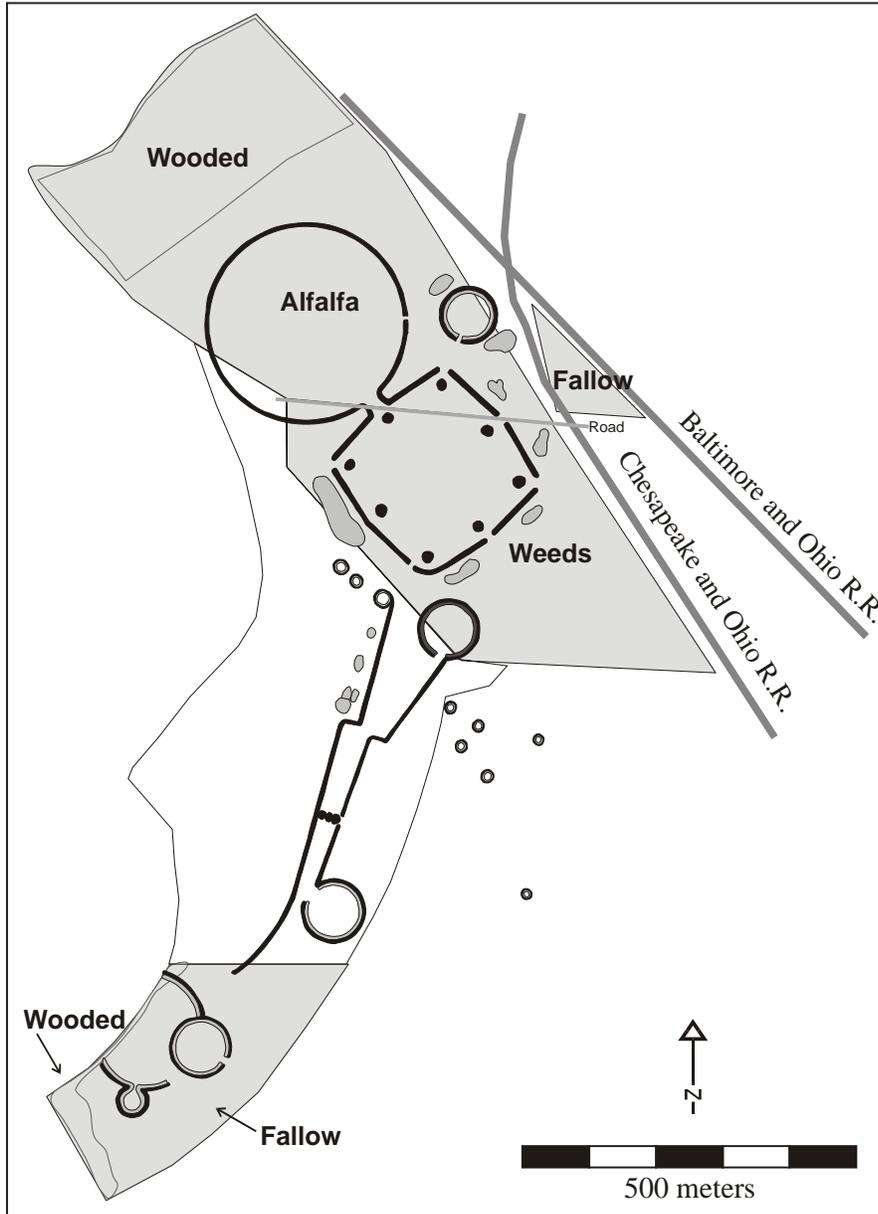
1. Area Map



2. Fire Unit Map



3. High Bank Works Unit Map



NPS land shaded in gray.

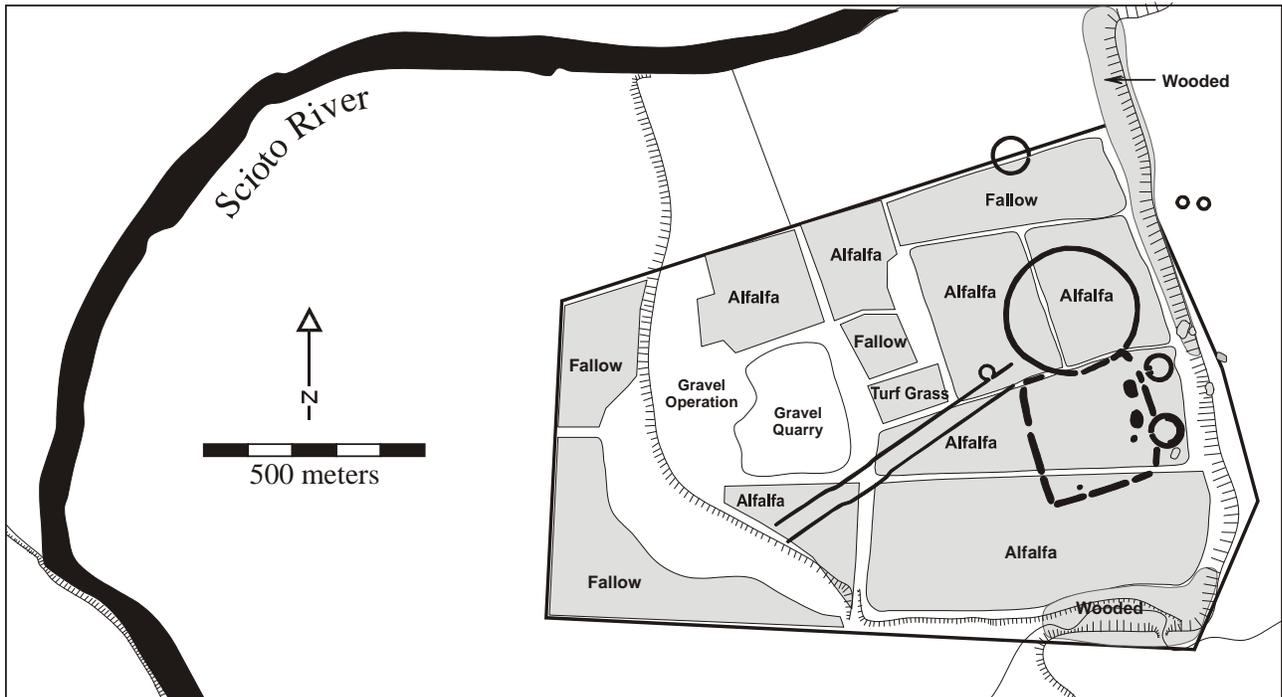
Archeological sites:

Earthworks depicted by black lines.

Mounds depicted by black circles.

Ditches and borrow pits depicted by gray lines or circles.

4. Hopeton Earthworks Unit Map



NPS land shaded in gray.

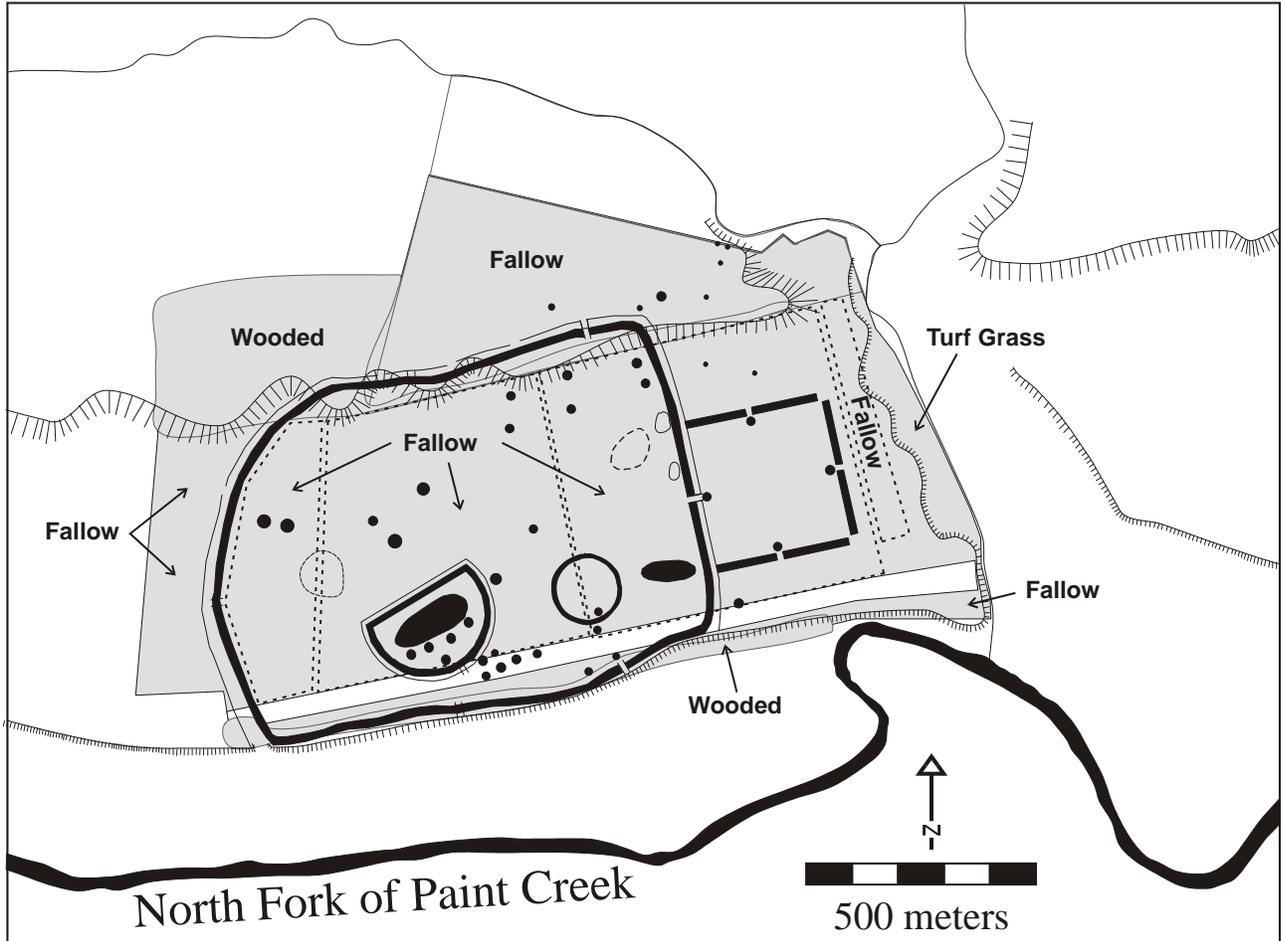
Archeological sites:

Earthworks depicted by black lines.

Mounds depicted by black circles.

Ditches and borrow pits depicted by gray lines or circles.

5. Hopewell Mound Group Unit Map



NPS land shaded in gray.

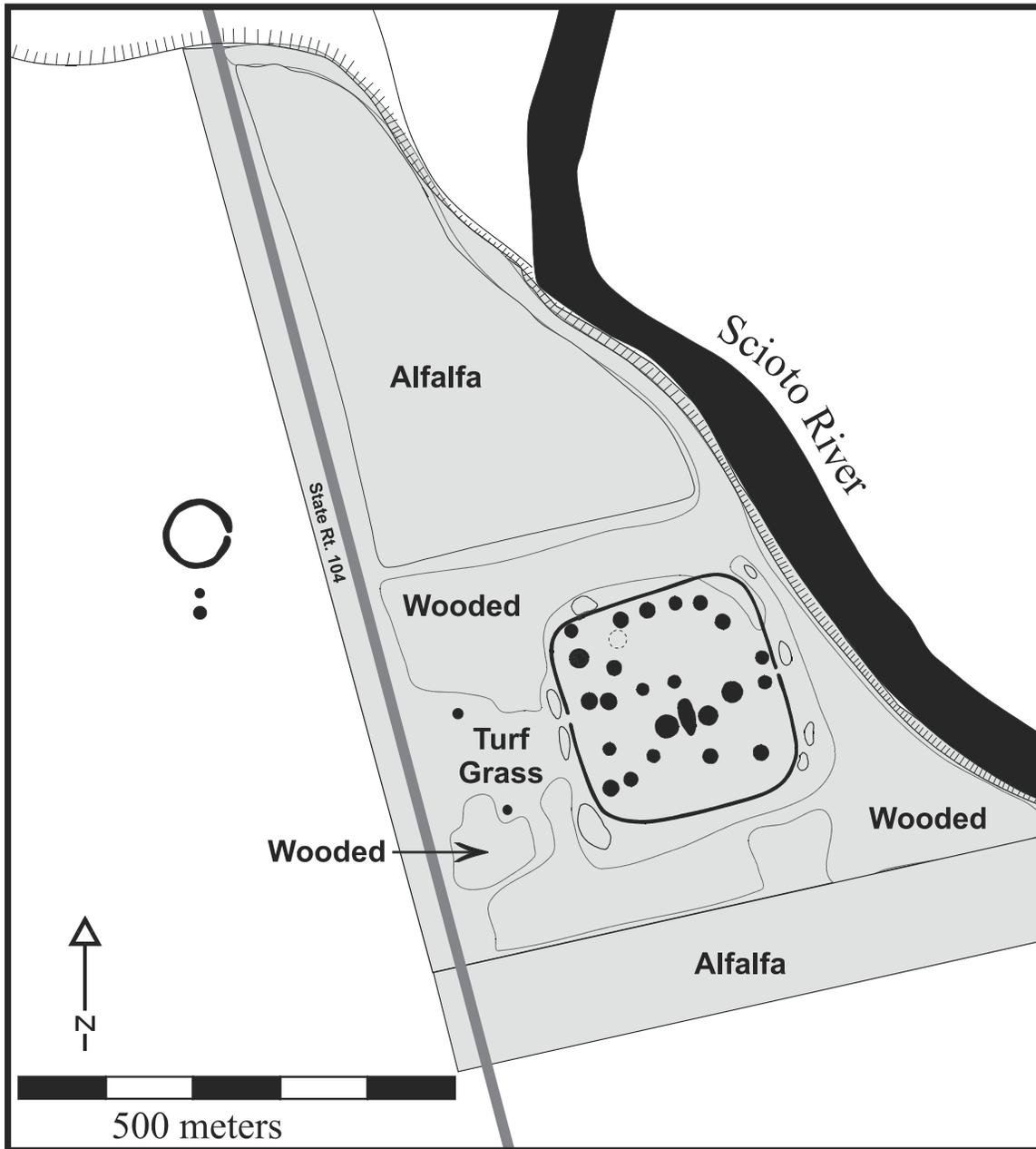
Archeological sites:

Earthworks depicted by black lines.

Mounds depicted by black circles.

Ditches and borrow pits depicted by gray lines or circles.

6. Mound City Group Unit Map



NPS land shaded in gray.

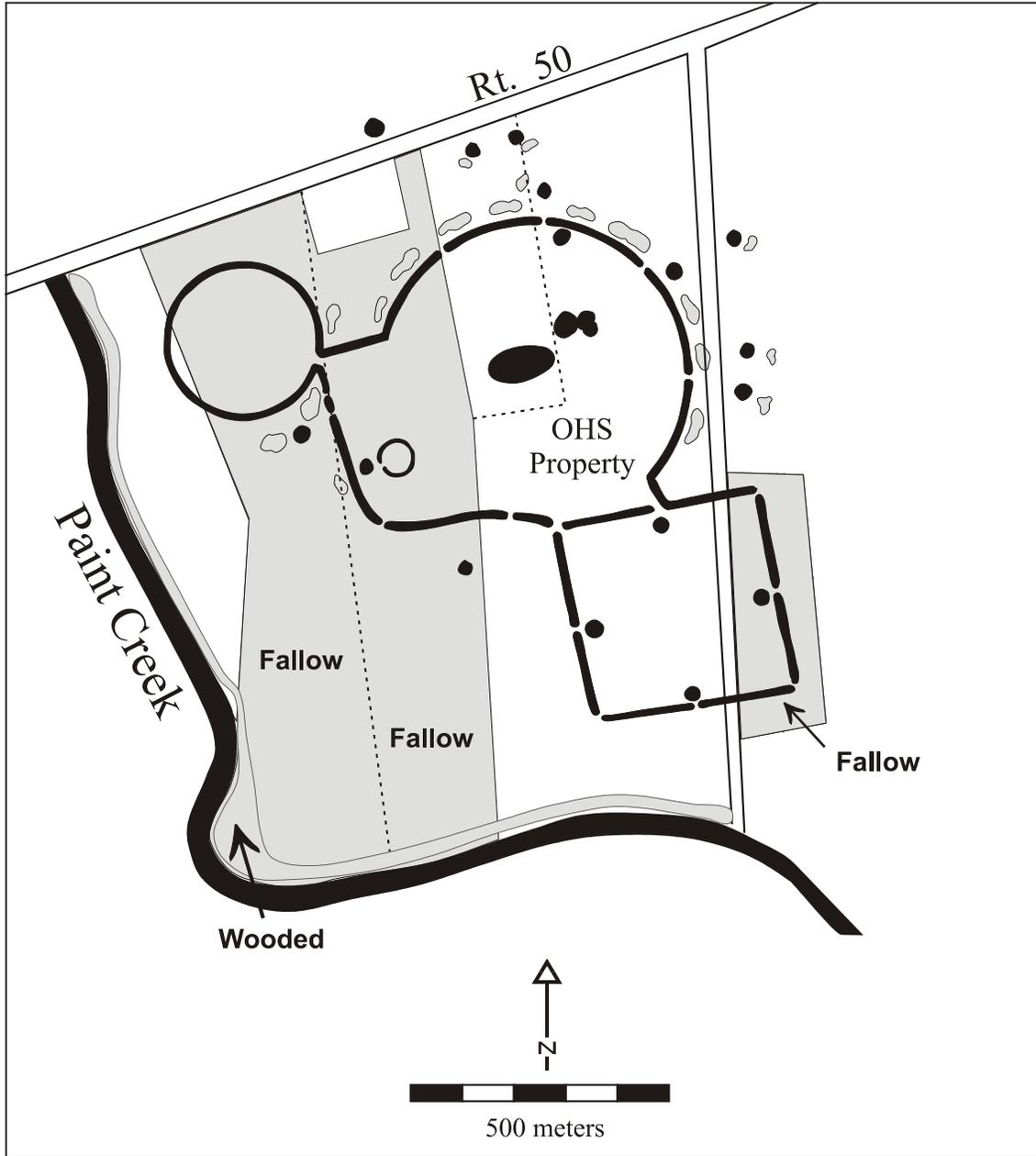
Archeological sites:

Earthworks depicted by black lines.

Mounds depicted by black circles.

Ditches and borrow pits depicted by gray lines or circles.

7. Seip Earthworks Unit Map



NPS land shaded in gray.

Archeological sites:

Earthworks depicted by black lines.

Mounds depicted by black circles.

Ditches and borrow pits depicted by gray lines or circles.

T. Wildland Fire Implementation Plan, Stage 1 Form

Fire Name					
Fire Number					
Jurisdiction(s)					
Administrative Unit(s)					
FMP Unit(s)					
Geographic Area					
Management Code					
Start Date/Time					
Discovery Date/Time					
Current Date/Time					
Current Size					
Location:	Legal Description(s)	T.	R.	Sec.	Sub.
	Latitude				
	Longitude				
	UTM:				
	County:				
	Local Description				
Cause					
Fuel Model/Conditions					
Current Weather					
Predicted Weather					

DECISION CRITERIA CHECKLIST

Decision Element

Yes

No

Is there a threat to life, property, or resources that cannot be mitigated?

Are potential effects on cultural and natural resources outside the range of acceptable effects?

Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?

Is there other proximate fire activity that limits or precludes successful management of this fire?

Are there other Agency Administrator issues that preclude wildland fire use?

The Decision Criteria Checklist is a process to assess whether or not the situation warrants continued wildland fire use implementation. A “Yes” response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.

Recommended Response Action (check appropriate box)

NO-GO (Initial attack/suppression action)

GO (Other appropriate management response)

Signature	Date
-----------	------

U. Individual Fire Report (DI-1202)

UNITED STATES DEPARTMENT OF THE INTERIOR DI-1202 INDIVIDUAL FIRE REPORT		3.a. UNIT B. SUB-UNIT C. YEAR D. FIRE NUMBER --- --- --- ---	4. TYPE 5. CAUSE 6. PEOPLE 7. NRVC --- --- --- ---
1. STATUS CODE ___ 2. REPORTING AGENCY ___			
8. STATISTICAL DATA			
a. STATE	b. OWNER	c. VEGETATION	d. ACRES BURNED
---	---	---	-----
---	---	---	-----
---	---	---	-----
---	---	---	-----
---	---	---	-----
---	---	---	-----
---	---	---	-----
---	---	---	-----
9. AGENCY DATA			
a. FIRE NAME	b. AREA NAME	c. LATITUDE	LONGITUDE
-----	-----	-----	-----
d. TWNSHP	RANGE	SECTION	MERIDIAN
---	---	---	---
e. COST CODE	f. OWNER	g. FY	h. FISCAL DATA
---	---	---	-----
		i. UTM	Z E N
		---	---
10. FIRE MANAGEMENT DATA			
	DATE	TIME	TYPE
a. DISCOVERY/START	-----	---	---
			AMT XXXXXXXXXX XXXXXXXXXX
b. INITIAL ATTACK	-----	---	---
		1 2 3	1 2 3
c. CONTROLLED	-----	---	---
d. DECLARED OUT	-----	---	---
11. SITE DATA			
a. TOPOGRAPHY	b. ASPECT	c. SLOPE	d. ELEVATION
---	---	---	---
e. STATION	f. MSGC	g. BEHAVIOR	h. B. I.
-----	---	---	---
i. ADJ CLASS			

12. PREVENTION DATA			
k. DAY OF WEEK	l. WAS FIRE INVESTIGATED (Y/N)	m. FIRE CAUSE SUSPECT, KNOWN OR UNKNOWN (K/U)	n. SUSPECT = RESIDENT, TRANSIENT OR UNKNOWN (R/T/U)
---	---	---	---
13. PRESCRIBED FIRE DATA			
c. PLOT/ BURN OBJECTIVE	d. FIRING TYPE	e. COST/ACRE	f. FBPS FUEL MODEL
-----	---	---	---
i. PROJECT #			

m. COMPLEXITY / FIRE MANAGEMENT AREA	n. FUEL LOADING FOR EMISSIONS		o. BENEFITTING PROGRAM
	SIZE CLASS OF FUELS	PRE-BURN LOADING TONS PER ACRE	CONSUMPTION PERCENT
	Shrub/Herb	---	---
	0 - 1	---	---
	1.1 - 3.0	---	---
	3.1 - 9.0	---	---
	9+	---	---
	LITTER & DUFF (INCHES)	---	---

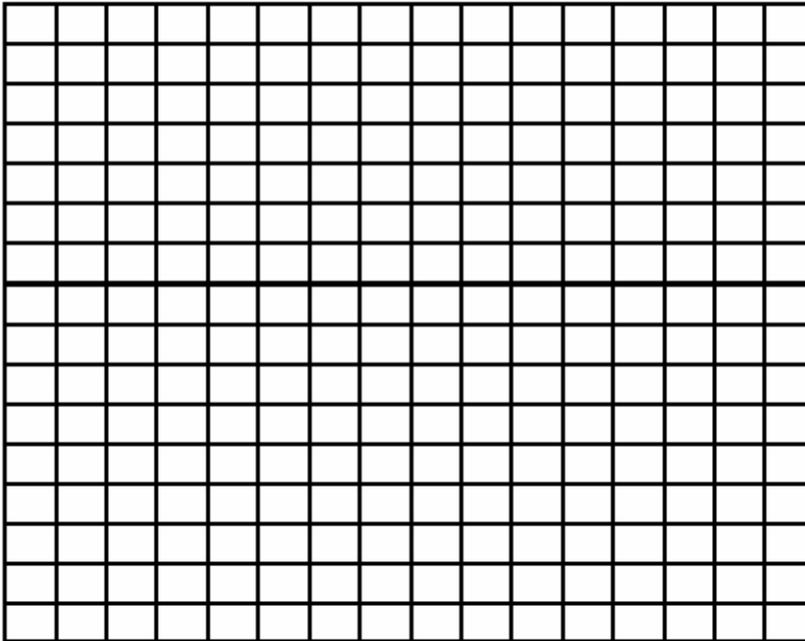
NARRATIVE - Enter information about the fire.

TITLE INFORMATION - (Mandatory)

Submitted by:
Submitted Title:
Submitted Date:
Entered by:
Entered Title:
Entered Date:

MAP: - (Optional)

LOCATION PLAT SCALE: " = 1 MILE



Prepared for:

Hopewell Culture National Historical Park
National Park Service
16062 State Route 104
Chillicothe, Ohio 45601

By:



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